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CITY OF LOVINGTON New Mexico

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# CITY OF LOVINGTON 40-YEAR WATER DEVELOPMENT PLAN

by

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prepared for

City of Lovington New Mexico

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## CITY OF LOVINGTON 40-YEAR WATER DEVELOPMENT PLAN

#### **EXECUTIVE SUMMARY**

The City of Lovington is currently experiencing economic development as a result of ongoing development of natural resources in the area, and development of renewable energy and high technology sectors. The City's water supply comes from the Lea County Underground Water Basin, in which groundwater is present in the High Plains aquifer. Groundwater in the aquifer is being pumped out at a faster rate than it is being recharged. The City's seventeen active water-supply wells are located several miles southeast of the City, and are susceptible to point source and non-point source pollution associated with agriculture, and point-source pollution related to nearby refinery, pipelines, and other oil and gas operations.

The City owns a total of 6,017.58 acre-feet per year (ac-ft/yr) of water rights and permits for municipal use. Based on population projections and a total gallons per capita per day (GPCD) goal of 210 GPCD, projected water demand at the end of the 40-year planning period in 2062 will be about 5,810 ac-ft/yr, demonstrating a need for the City's existing rights. Due to the potential need to use the City's existing wells and water rights for pollution control purposes in the future, a 10-percent pollution control safety factor should be applied. The safety factor assumes that up to 10 percent of the City's existing rights, or 601.76 ac-ft/yr, will need to be used for pollution control in the future. Thus, up to 394 ac-ft/yr in additional rights (601.76 minus the difference between 6,017.58 and 5,810) may be needed to meet the City's future demand for potable water supply. The City also provides bulk water for nearby oil and gas and refining operations (not included in GPCD indicated above), and the amount available for this use may decrease over time as the City's demand for potable water supply for other municipal uses increases.

The City's proposed Water Conservation Plan includes collection of additional data on diversions and metered deliveries and a water system audit, evaluation of the water rate structure, expansion of water reclamation, improvements to the Emergency Water Restrictions Ordinance, and development of a water conservation ordinance.

The Water Development Plan includes implementation of the Water Conservation Plan, development of a master plan to guide long-range water capital improvements, a groundwater level monitoring program, evaluation of potential to reactivate the well field within the City limits, transfer of existing water rights, and acquisition and transfer of additional water rights. It is also recommended that the City review metering and pricing of bulk water provided to nearby oil and gas and refining operations, which could help offset costs associated with maintenance and development of supply to meet existing and future demand.

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## ABBREVIATIONS/ACRONYMS

ASRaquifer storage and recoveryAWWAAmerican Water Works AssociationBasin GuidelinesLea County Underground Water Basin Guidelines for Review of Water Rights ApplicationsCPIconsumer price indexDPRdirect potable reuseEDCEconomic Development CorporationEPAEnvironmental Protection Agencyft/yrfeet per yearGPCDgallons per capita per daygal/mongallons per minutegpm/ftgallons per minute per feetHOAhand off autoICIindustrial, commercial, and institutionalICIPInfrastructure and Capital Improvement PlanJSAIJohn Shomaker & Associates, Inc.MGDmillion gallons per literNMACNew Mexico Environment Department, Drinking Water BureauNMED/GWBNew Mexico Environment Department, Drinking Water BureauNMED/FSTBNew Mexico Environment Department, Petroleum Storage Tank BureauNMOSENew Mexico Statutes AnnotatedNWRINational Water Research InstituteOCDOil Conservation DivisionROreverse osmosisSCADAsupervisory control and data acquisitionTDStotal dissolved solidsUNM-GPSUniversity of New Mexico Geospatial and Population StudiesUSGSU.S. Geological SurveyVOCsvolatile organic compounds	ac-ft/yr	acre-feet per year
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VOCs volatile organic compounds	USGS	U.S. Geological Survey
	VOCs	volatile organic compounds

## CITY OF LOVINGTON 40-YEAR WATER DEVELOPMENT PLAN

#### **1.0 INTRODUCTION**

The City of Lovington contracted with John Shomaker & Associates, Inc. (JSAI) to prepare a 40-Year Water Development Plan for the planning period 2023 to 2062. The primary purpose of 40-year water development planning is to assess the amount of water needed to meet current and future demand in relation to the amount of water rights currently permitted or licensed, and available groundwater in storage in the Lea County Underground Water Basin in the vicinity of the City's well fields. Figure 1 is an aerial photograph showing the Lea County Underground Water Basin.

New Mexico Statutes Annotated (NMSA) Section 72-1-9 indicates that municipalities shall be allowed a water use planning period for reasonably projected additional needs within forty years. Thus, the State of New Mexico allows municipal water systems such as City of Lovington to acquire and hold water rights in an amount equal to its reasonably projected needs within 40 years. The contents of water development plan are listed in New Mexico Administrative Code (NMAC) Section 19.26.2.19.B and may be referenced from the 2014 version of City of Lovington's 40-Year Water Development Plan (JSAI, 2014).

#### 2.0 BACKGROUND

#### 2.1 Previous Work

The previous version of the City of Lovington 40-Year Water Development Plan was prepared in 2014 (JSAI, 2014). The Lea County Regional Water Plan, first prepared in 2000 (JSAI, 2000), and most recent version prepared in 2016 (NMISC, 2016), addresses issues of water demand and supply in Lea County, including the City of Lovington. The draft Lea County Deep Aquifer Study evaluated potential deeper groundwater resources to be explored and developed in Lea County (JSAI, 2004 second draft). The City of Lovington Comprehensive Plan, prepared in 2015 (ARC, 2015), includes population projections and summarizes water supply, infrastructure, and opportunities for water conservation.



Figure 1. Aerial photograph for City of Lovington area showing the Lea County Underground Water Basin, Lea County, New Mexico.

#### 2.2 Hydrogeologic Setting

Water supply for City of Lovington comes from groundwater resources within the Lea County Underground Water Basin. Groundwater in the Lea County Underground Water Basin is present in the High Plains aquifer, also sometimes referred to as the Ogallala aquifer. Details of the High Plains aquifer may be referenced from the 2014 version of City of Lovington's 40-Year Water Development Plan (JSAI, 2014). Groundwater in the aquifer is being pumped out at a faster rate than it is being recharged. Current aquifer saturated thickness can be calculated based on recent water-level measurements and depth to the top of the underlying Triassic-age rocks, also sometimes referred to as the "red beds."

#### 2.3 Basin Water-Rights Administration

The most recent version of the Lea County Underground Water Basin Guidelines for Review of Water Rights Applications (Basin Guidelines) was adopted by the New Mexico State Engineer on February 12, 2014. Details on administration of water rights in the Lea County Underground Water Basin may be referenced from the 2014 version of City of Lovington's 40-Year Water Development Plan (JSAI, 2014).

#### 2.4 Water Planning Survey

In an effort to better understand the concerns and interests of Lovington water customers regarding water supply, water use, and water conservation for planning purposes, a survey was provided to customers as an insert with their water bill. Responses to the survey can help guide water planning going forward. There was a strong response to the survey, with over 130 survey responses received. The survey results are presented in Appendix A, and a summary of the results are presented in Figure 2.

In terms of awareness and concern for water supply to meet current and future demands, the majority of customers who responded to the survey agreed that water supply is scarce and susceptible to contamination, that ongoing droughts have negatively affected supply and water is being pumped from the aquifer faster than it recharges, and that water should be conserved to ensure future supply.



Figure 2. Pie charts summarizing results of the water planning survey, City of Lovington, New Mexico.

A strong majority, about 90 percent of those who responded, agreed that recycled water should be used to irrigate parks and sports fields. About 64 percent of those who responded agreed that a landscaping ordinance should be adopted for new developments to minimize water use.

Overall, a slight majority of customers who responded to the survey have already implemented water-conserving measures at home, and a slight majority are willing to consider implementing water-conserving measures in the future. A majority of customers who responded to the survey have low-flow toilets and low-flow showerheads. Very few of the customers who responded have xeriscape yards or have hot water recirculating systems in their homes, which could represent opportunities for additional water conservation.

In terms of water conservation measures that customers would consider implementing in the future, the majority of customers who responded would consider replacing older appliances with high-efficiency appliances, installing low-flow or ultra-low flow toilets and low-flow showerheads, and modifying landscaping to reduce water use. The majority of customers who responded would consider supporting a landscape watering schedule with odd/even addresses on odd/even calendar days, and would consider limiting landscape water to the morning hours prior to 10 am and evening hours after 6 pm.

In cases that customers indicated that they would not consider implementing waterconserving measures, customer comments provided some insight: Some customers felt that they have already implemented water-conservation measures to the extent reasonable or possible, and some measures may not be applicable to a customer's particular situation. In some cases, customers may not have been familiar with certain terms like hot water recirculation or rain harvesting. There were certainly concerns about costs, and cost-benefit analysis associated with certain waterconserving measures. A number of customers commented that the City should prioritize infrastructure maintenance and upgrades to reduce water losses in order to conserve water.

#### 3.0 WATER SUPPLY

As mentioned above, the City of Lovington's water supply is groundwater in the High Plains aquifer, which is being pumped out at a faster rate than it is being recharged. Current saturated thickness in the aquifer can be calculated based on recent water-level measurements and depth to the top of the underlying Triassic-age rocks, or "red beds." Figures 3 and 4 present three-dimension diagrams showing aquifer saturated thickness in the vicinity of Lovington, illustrating that saturated thickness is variable, with local areas of significantly higher saturated thickness.



Figure 3. Three-dimensional diagram showing aquifer saturated thickness based on water-level elevations and top-of-red-bed elevations, and selected active supply wells for City of Lovington, looking northwest in Township 16 South, Range 36 East, Lea County, New Mexico.

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Figure 4. Three-dimensional diagram showing aquifer saturated thickness based on water-level elevations and top-of-red-bed elevations, and selected active supply wells for City of Lovington, looking east-southeast in Township 16 South, Range 36 East, Lea County, New Mexico.

Current saturated thickness has been estimated by New Mexico Office of the State Engineer (NMOSE) in the July 2022 version of the NMOSE administrative groundwater-flow model. Table 1 presents estimates of current and future saturated thicknesses in the areas in which City of Lovington wells are located. Figure 5 presents a map showing NMOSE model-predicted saturated thickness in 2045 in the vicinity of City of Lovington assuming pumping of full water rights and permits by all users. This map should be interpreted cautiously, as Table 1 shows that NMOSE model-predicted average water-level decline rates are much greater than the decline rates observed in recent years. This is discussed in more detail below. Figure 6 presents the locations of all City-owned wells; the City's seventeen water-supply wells that are currently active are located in the well field several miles southeast of the City (also referred to as the southern well field in this report).

In addition to NMOSE model-predicted declines, water-level trends for the area surrounding the City of Lovington, and the City's well fields, were evaluated using historical water-level data for wells monitored by the U.S. Geological Survey (USGS). Hydrographs for wells monitored by USGS with at least ten data points, and a period of record ending in 2015 or later, are included in Appendix B. The average decline rate within the City limits was about 0.53 ft/yr based on trends for nearby USGS-monitored wells, whereas the average decline rate for the City well field located south of the City limits was about 0.95 ft/yr (Table 2). These decline rates are significantly lower than those from the NMOSE model, as compared in Table 1.

Observed decline rates within the City limits are a small fraction of the NMOSE modelpredicted rates, and observed decline rates for the City's southern well field are about half of the NMOSE model-predicted rates. For this reason, the NMOSE model-predicted saturated thicknesses in 2045 and 2062 as presented in Figure 5 and Table 1 may be viewed as a worst-case scenario. For example, the depleted aquifer conditions predicted within the City limits appear to be due in part to the NMOSE model simulating City wells pumping in this area; in reality, these wells have been inactive for some time.

In contrast, remaining saturated thickness at the end of the 40-year planning period for areas in which City wells are located, based on recent decline rates from hydrographs and NMOSE 2022 saturated thickness, range from 102 to 156 ft (see Table 1).

T.R.S	area	NMOSE <sup>a</sup> 2022 saturated thickness, ft	NMOSE <sup>a</sup> 2045 saturated thickness, ft	NMOSE <sup>a</sup> 2062 saturated thickness, ft	NMOSE average decline rate, ft/yr	recent decline rate from hydrographs, <sup>c</sup> ft/yr	2062 saturated thickness based on recent water-level decline rate, ft
16S.36E.03		137	57	40	2.4		116
16S.36E.04	nits	156	72	51	2.6		134
16S.36E.09	y lin	146	27	0	3.7	0.53	125
16S.36E.10	Cit	123	0	0	5.3		102
16S.36E.15		173	73	21	3.8		152
16S.36E.25		176	108	68	2.7		138
16S.36E.26	р	168	104	69	2.5		130
16S.36E.35	fiel	186	125	89	2.4		148
16S.36E.36	well	169	95	52	2.9	0.05	131
16S.37E.30	ern	157	102	66	2.3	0.95	119
16S.37E.31	outho	175	109	69	2.7		137
17S.36E.01	sc	178	115	77	2.5		140
17S.36E.02		194	139	105	2.2	]	156

# Table 1. Estimated current and future saturated thicknesses for areas in whichCity of Lovington wells are located, Lea County, New Mexico

<sup>a</sup> July 2022 version of NMOSE administrative groundwater-flow model

<sup>c</sup> based on water level data collected from 1995 to present by USGS; see hydrographs in Appendix B

T.R.S - Township, Range, Section

NMOSE - New Mexico Office of the State Engineer

USGS - U.S. Geological Survey

italics - based on NMOSE model prediction of zero saturated thickness by 2045 or 2062



Figure 5. Map showing NMOSE model-predicted saturated thickness in 2045 in the vicinity of City of Lovington, Lea County, New Mexico.

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Figure 6. Aerial photograph showing City of Lovington wells, Lea County, New Mexico.

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USGS ID	T.R.S.qqq	rate of decline, ft/yr	City well field area T.R.S
325730103213901	16S.36E.04.32232	0.07	
325624103222001	16S.36E.08.211112	0.04	City limits
325645103171501	16S.37E.07.114224	0.55	(16S.36E.03; 16S.36E.04;
325541103173801	16S.37E.07.33320	1.06	16S.36E.09;
325436103191001	16S.36E.23.241324	0.91	16S.36E.10; 16S.36E.15)
average		0.53	
325436103191001	16S.36E.23.241324	0.91	southern well field
325137103191701	17S.36E.02.411123	0.73	(16S.36E.25, 16S.36E.26
325125103162501	17S.37E.05.34442	1.21	16S.36E.35,
average		0.95	16S.36E.36, 16S.37E.30, 16S.37E.31, 17S.36E.01, 17S.36E.02)

# Table 2. Summary of U.S. Geological Survey hydrographs nearCity of Lovington, Lea County, New Mexico

USGS - U.S. Geological Survey

T.R.S.qqq - township, range, section, quarter quarter quarter

#### 4.0 WATER SYSTEM

Figure 6 shows all City-owned wells, and Table 3 presents a summary of the City's seventeen active water-supply wells currently in use, which are located several miles southeast of the City on both sides of the Lovington-Hobbs Highway (Highway 18; southern well field). Total depths of active supply wells range from 220 to 266 ft, and approximate production capacities range from 200 to 1,000 gallons per minute (gpm). Specific capacities for active supply wells, based on information provided in Proof of Completion of Well forms submitted to NMOSE, range from 1.9 to 55.6 gpm/ft of drawdown. A table of all City wells is included as Appendix C. The groundwater supply is of good quality; a summary of water quality data is provided in Appendix D.

In addition to water-supply wells, the water system includes 2 booster pump stations, 3 water towers, 4 underground storage reservoirs and a distribution system of approximately 30 miles (https://www.lovington.org/water.html).

City well No.	NMOSE ID No.	date drilled	total depth, ft	screen interval, ft	non-pumping water level from PCW, ft	pumping water level from PCW, ft	pumping test rate from PCW, gpm	Q/s estimated from PCW, gpm/ft
2	L-4058-S-14	5/6/1965	260	50 to 240	52	83	1,000	32.3
4	L-4984-S-19	5/25/1965	240	50 to 220	55	82	1,000	37.0
5	L-4984-S-2	6/5/1965	240	50 to 220	51	72	1,000	47.6
6A	L-5486-S	5/1/1992	232	82 to 232	105	136	1,000	32.3
7	L-4984-S-3	5/29/1965	220	50 to 200	42	65	1,000	43.5
8	L-4984-S-4	6/2/1965	240	50 to 220	53	80	1,000	37.0
9	L-4058-S-15	5/5/1965	260	50 to 240	54	82	1,000	35.7
11	L-4058-S-17	4/29/1965	266	50 to 246	54	75	600	28.6
12	L-4058-S-18	5/1/1965	265	50 to 255	52	83	800	25.8
13	L-4058-S-19	5/3/1965	245	50 to 225	52	84	800	25.0
14	L-4058-S-24	4/7/2000	257	89 to 257	104	112	400	50.0
15	L-4508-S-21	1//28/1981	251	70 to 251	82	95	500	38.5
18	L-4508-S-25	4/13/2000	256	96 to 256	109	118	500	55.6
21	L-5486	6/4/1973	225	170 to 220	62	102	800	20.0
27	L-4058-S-27	10/4/2011	225	155 to 215	95.3	130	400	11.5
30	L-4058-S-30 ª	2011	240	170 to 230	95	200	200	1.9
31	L-4058-S-31	10/11/2011	230	160 to 220	94.8	126	400	12.8

Table 3. Summary of City of Lovington active water-supply wells

<sup>a</sup> permit to replace well with L-4058-POD26 within 100 ft of existing well approved by NMOSE in 2019

NMOSE - New Mexico Office of the State Engineer

PCW - Proof of Completion of Well form submitted to New Mexico Office of the State Engineer

Q/s - specific capacity

gpm/ft - gallons per minute per foot of drawdown

#### 5.0 POTENTIAL SOURCES OF CONTAMINATION

A variety of sources, both point sources originating from discrete locations and non-point sources originating over more widespread or unspecified areas, have the potential to cause pollution and contaminate the City's groundwater supply. The presence of numerous dairy operations and current or historic feed lots in the region, and elevated nitrate concentrations in selected wells in the City's southern well field, suggest the potential for point source or non-point source pollution associated with agriculture.

The proximity of the City's southern well field to the Navajo Lovington Refinery, pipelines, and numerous other oil and gas operations represents high potential for point-source pollution; numerous spills and leaks primarily of crude oil and produced water, as well as fuels, condensate, brine water, and produced water have been documented by the Oil Conservation Division (OCD).

In addition, the New Mexico Environment Department/Petroleum Storage Tank Bureau (NMED/PSTB) has documented a number of leaking petroleum sites within the City limits, which have the potential to contaminate nearby wells. Figure 7 presents locations of potential point sources, and Appendix E presents a summary of point sources of particular concern, and a table containing a list of potential point sources. Figure 8 provides a more detailed map of potential point sources near the City's active supply wells.

Although potential sources of groundwater contamination are certainly a concern, it should be noted that of the 360 OCD spills listed in Appendix E, only 13 are indicated to have impacted groundwater. The majority of these 13 sites appear to be located near the Navajo Lovington Refinery and generally do not appear to be directly up-gradient or across-gradient from the active supply wells, although location information may be inaccurate. The Navajo Lovington Refinery represents a groundwater abatement site on-file with OCD to address impacts to groundwater. It should also be noted that of the 19 NMED/PSTB leaking petroleum sites listed in Appendix E, all but five have been designated as no-further-action. The no-further-action designation indicates that groundwater contamination has been contained and remediated at these sites.

In terms of source water protection at the City's active supply wells, inspection of Figure 8 suggests potential concern at L-4984-S-2 (City Well 5), as two OCD spill sites appear to be located within very close proximity, up-gradient and across-gradient from L-4984-S-2. As noted above, location information may be inaccurate. Although these two sites do not appear to indicate impact to groundwater, periodic sampling and analysis for volatile organic compounds (VOCs) using EPA method 8260B is recommended for L-4984-S-2 due to its general location down-gradient and across-gradient from the Navajo Lovington Refinery.



Figure 7. Aerial photograph showing City of Lovington and the City's southern well field, sites identified by NMED and OCD that represent potential point sources of pollution, and water-level elevation contours.

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Figure 8. Aerial photograph showing City of Lovington wells located in the City's southern well field, sites identified by NMED and OCD that represent potential sources of pollution, and water-level elevation contours.

Plans to replace L-4058-S-30 (City Well 30) with L-4058-POD26 within close proximity of the existing well appear to be feasible in terms of source water protection; the well location appears to be up-gradient of documented potential sources of contamination (see Fig. 8). The location of wastewater lines near the replacement well will need to be evaluated for compliance with NMED regulations.

#### 6.0 WATER RIGHTS

A summary of the City's water rights is presented in Table 4, and wells under the City's rights and permits are shown on Figure 6. The City owns a total of 6,017.58 ac-ft/yr of water rights and permits for municipal use within and near the City of Lovington. The City owns an additional 775.9 ac-ft/yr of irrigation rights, and leases an additional 1,845.75 ac-ft/yr of irrigation rights. Appendix F presents a discussion of the City's water rights and permits.

Figure 9 is a pie chart summarizing the City's water rights and permits, and points of diversion. As shown on Figure 9, the majority of the City's permits (3,697 ac-ft/yr under L-4058 et al.) have points of diversion within the City limits and the well field located southeast of the City (southern well field). However, a significant amount of water rights (968 ac-ft/yr under L-208 et al.) have points of diversion within the City limits only. The primary issue in this area may be limited remaining saturated thickness. Potential sources of groundwater contamination may no longer be a major issue within the City limits, as most of the PSTB leaky underground storage tank sites have now been designated "no further action" (see Fig. 7), although the potential for elevated nitrate concentrations may remain. L-208 et al. represents a licensed water right that could be transferred to an area with greater remaining saturated thickness if necessary.

A significant amount of permits (a total of 1,353 ac-ft/yr under L-4984 et al. and L-5486 et al.) have points of diversion in the southern well field only. The primary issue in this area may be potential sources of groundwater contamination. Full beneficial use from the current points of diversion may need to be demonstrated prior to transferring these permits to another area if it became necessary to do so because of contamination.

NMOSE file number(s)	type	use	diversion, ac-ft/yr	well location	comments
L-4058 thru L-4058-S-12 & L-70 Comb; L-53-AA, L-1702, L-1703 & L-1704-Comb-A	permit	municipal	3,697.14	T16S.R36E	
L-208, L-208-S	license	municipal	967.84	T16S.R36E	600 gpm
L-4984; L-1718, L-1719, L-4957, L-4984, L-5060 & L-5458-Comb-S	permit	municipal	1,094.6	T16S.R37E	
L-5486 & L-5486-S; L-5164 into L-5486	permit	municipal	258	T17S.R36E	
total rights and permits owned by City of Lovin	6,017.58				
L-1716	license	irrigation	351.3	T17S.R36E	10 acres sold; 117.1 acres remainin
L-2481	license	irrigation	424.6	T17S.R36E	182.4 acres

775.9

Table 4. Summary of City of Lovington water rights and permits

NMOSE - New Mexico Office of the State Engineer T.R. - Township, Range ac-ft/yr - acre-feet per year gpm - gallons per minute

total rights owned by City of Lovington for irrigation use



Figure 9. Pie chart summarizing water rights and permits, and points of diversion, for municipal use, for City of Lovington, Lea County, New Mexico.

## 7.0 WATER DEMAND

#### 7.1 Population

#### 7.1.1 Current Population

U.S. Census 2020 indicated a population of 11,668 for the City of Lovington. This is the current population served by the City's water system. Table 5 presents a comparison of U.S. Census 2000, 2010, and 2020 population data for City of Lovington. As shown on Figure 10, City population had been relatively stable between 1990 and 2000, and has increased since then.

parameter	2000	2010	2020	2000-2020 percent change	average annual percent change
total population	9,471	11,009	11,668	23.2	1.2
occupied housing units	3,297	3,572	3,813	15.7	0.8
total housing units	3,823	3,956	4,224	10.5	0.5
average household size	2.80	2.99	3.15	12.5	0.6
population in group quarters	236	329	253	7.2	0.4

Table 5. U.S. Census data for City of Lovington

#### 7.1.2 Population Growth Projections

The City of Lovington and Lea County in general are experiencing significant economic development as a result of ongoing development of natural resources in the area, and development of renewable energy and high technology sectors. In addition to the new hospital in Lovington (ARC, 2015; NMISC, 2016), the Lovington Economic Development Corporation (EDC) announced two new members in their September 2021 newsletter: companies providing construction, and automation and electric services to the oil and gas industry. The Lovington EDC also announced a major solar contract for a 300-megawatt solar installation in the City's industrial park. Residential development is planned for the areas north and northwest of the City, and the City is working towards meeting the water demands associated with future growth in that area (ARC, 2015; Cunningham, 2022).



Figure 10. Graph of historical and projected population for City of Lovington, Lea County, New Mexico.

Population projections for the City of Lovington for the 40-year planning period are presented in Table 6 and Figure 10. Population projections are based on the low-, medium-, and high-growth rates presented in the City's Comprehensive Plan (ARC, 2015). The high-growth rate corresponds to an annual growth rate of 1.8 percent based on the University of New Mexico Geospatial and Population Studies (UNM-GPS) 2012 projections for Lea County (this is also the average growth rate that City of Hobbs has been experiencing since 2000). The medium-growth rate is 1.2 percent annually, and the low-growth rate is 0.4 percent annually. The projected population of City of Lovington at the end of the 40-year planning period (year 2062) is 24,683 based on a high-growth rate, more than double the current population.

year	City of Lovington population, high growth, 1.8 percent annually	City of Lovington population, medium growth	City of Lovington population, low growth
2020		11,668 <sup>a</sup>	
2030	13,947	13,146	12,143
2040	16,671	14,812	12,638
2050	19,926	16,688	13,152
2060	23,818	18,803	13,688
2062	24,683	19,257	13,798

Table 6. Population projections for City of Lovington

<sup>a</sup> U.S. Census 2020

#### 7.2 Water Use

Figure 11 and Table 7 present total gallons per capita per day (GPCD) water use for City of Lovington based on diversion records and population estimates between 1990 and 2020. Figure 11 shows that population increased over this time period, but total GPCD water use decreased overall. This resulted in groundwater diversions remaining fairly steady during this time period, as shown in Figure 12.

Although these historical total GPCD numbers show significant variability (see Table 7), Figure 13 shows that total GPCD generally increased between 1990 and 2000 as annual average temperature increased, and precipitation decreased. Increases in temperature and decreases in precipitation appear to have continued from 2000 to present, but the City's baseline conservation practices and greater public awareness of conservation have resulted in decreasing GPCD between 2000 and present.



Figure 11. Bar chart of historical total gallons per capita per day (GPCD) and population for City of Lovington, Lea County, New Mexico.



Figure 12. Graph of historical and projected water demand and total gallons per capita per day (GPCD) water use for City of Lovington, Lea County, New Mexico.



Figure 13. Graph showing historical total gallons per capita per day (GPCD) water use, annual precipitation, and annual average temperature, City of Lovington, Lea County, New Mexico.

year	total metered diversions, ac-ft/yr	population served <sup>a</sup>	total GPCD <sup>b</sup>
1990	1,986 to 3,147 between 1981 and 1990; 2,591 on average	9,495	184 to 289 between 1981 and 1990; 241 on average
2000	2,509 to 3,485 between 1991 and 2000; 3,008 on average	9,471	237 to 333 between 1991 and 2000; 286 on average
2010	2,904 °	11,009	235
2020	2,617 to 3,320 between 2018 and 2021; 2,861 on average	11,668	219

Table 7	Historical	water	diversions	for	City	of I	ovington
Labit /.	Instorical	water	uivei 510115	101	City	ULL	ovingion

<sup>a</sup> U.S. Census

<sup>b</sup> [metered diversions] / population served

<sup>c</sup> NMISC (2016)

ac-ft/yr - acre-feet per year

GPCD - gallons per capita per day

It should be noted that these data do not include bulk water provided by the City to nearby oil and gas and refining operations, which is estimated to be up to 2 million gallons per day (MGD; 2,200 ac-ft/yr) in recent years. There have been issues with the metering of this water.

In general, there have been issues with the City's database and categorization of metered water deliveries (consumption) for residential, commercial, industrial, and unbilled uses in recent years, and therefore it was not possible to estimate residential GPCD. It also appears that consumption associated with irrigation of City parks is not metered. The City of Lovington is not the only community in the region to struggle with these issues; a 2015 water conservation plan prepared for City of Jal (SMA, 2015) estimated total GPCD of 342 in 2014 to be largely due to "46-48% of non-metered unaccounted for water used in the system."

Due to the issues with consumption data, non-revenue water and water losses could not be quantified. Based on older data presented in JSAI (2014) it may be reasonable to assume that water losses represent about 20 percent of total diversions.

### 7.3 Water Demand Projections

Water demand projections through year 2062 presented in Figure 12, in terms of total diversions, are based on projected population growth and projected total GPCD water use. Water demand projections presented in Table 8 are based on the high-growth population projection presented in Section 7.1.2, which is used to calculate projected water demand in order to ensure a safe and reliable water supply. Based on available data, current total GPCD use is estimated at about 219 GPCD, not including bulk water provided by the City nearby oil and gas and refining operations. In the absence of additional data, it was assumed that the City can achieve total GPCD use of 210 GPCD by the end of the 40-year planning period. The GPCD goal should be revisited once more data are available and the City's current GPCD has been better quantified.

time period	City of Lovington population	total GPCD use	projected water demand, ac-ft/yr
2020	11,668	219	2,861
2030	13,947	217	3,387
2040	16,671	215	4,010
2050	19,926	213	4,746
2060	23,818	210	5,618
2062	24,683	210	5,810

Table 8. Water demand projections for City of Lovington based onhigh-growth population projection

GPCD - gallons per capita per day ac-ft/yr - acre-feet per year

The total GPCD goal of 210 GPCD by 2062 is conservative, as some other water systems in the region have more aggressive goals; for example, Las Cruces has a total GPCD goal of 140 GPCD by 2055 (JSAI, 2017), and Alamogordo has a total GPCD goal of 165 GPCD by 2060 (JSAI, 2021). Deming has a total GPCD goal of 206 GPCD by 2050 (DBSA, 2009). Compared to City of Lovington, current water diversions and water use may be better-quantified for these water systems. It should also be noted that larger communities may have higher capital to invest in their water systems to minimize water losses and implement conservation measures.

In the absence of additional data to quantify current water use for City of Lovington, a total GPCD goal of 210 GPCD is presented here. Water demand projections presented in Table 8 indicate demand of 5,810 ac-ft/yr at the end of the 40-year planning period in 2062, demonstrating a need for the City's existing rights, which total 6,017.58 ac-ft/yr. These projections would allow the City to maintain the ability to serve future residential, commercial, and industrial accounts, but may not allow for provision of large quantities of unbilled bulk water to nearby oil and gas and refining operations in the future.

Due to the potential need to use the City's existing wells and water rights for pollution control purposes in the future, a 10 percent pollution control safety factor should be applied. The safety factor assumes that up to 10 percent of the City's existing rights, or 601.76 ac-ft/yr, will need to be used for pollution control in the future. Thus, up to 394 ac-ft/yr in additional rights (601.76 minus the difference between 6,017.58 and 5,810) may be needed to meet the City's future demand for potable water supply.

#### 8.0 WATER CONSERVATION PLAN

The City's baseline water conservation measures that are currently in place, including SCADA, metering, water rate structure, and water reclamation, are described in Appendix G. The City's water-related ordinances that promote conservation are included as Appendices H, I, and J. The City's Water Conservation Plan is presented below.

#### 8.1 Data Collection and Water System Audit

The City should collect monthly data on metered water diversions and all authorized metered water deliveries including billed, unbilled, and bulk water deliveries. Broken meters need to be replaced, and meters should be added for points of water diversion and delivery that are currently unmetered. A form for recording meter readings is attached in Appendix K.

Monthly data on metered water deliveries should be broken down into categories of billed authorized use such as residential (single-family and multi-family, if possible), and industrial, commercial, and institutional (ICI) use. Metered water deliveries for City parks/ball fields/cemetery, Lovington Aquatic Center, Chaparral Lake, fire department, and City buildings would be included under the ICI category. Metered water deliveries that represent unbilled authorized use, such as metered main flushing, sewer cleaning, potable well flushing, and non-potable production, should also be tracked. Authorized water deliveries should be metered to the extent possible in order to minimize unmetered authorized water deliveries and provide useful data for the water system audit.
Once comprehensive monthly data have been collected for a 2-year period, these data should be analyzed and a water system audit performed. The audit would compare the amount of authorized metered water deliveries on a monthly basis to the amount of water diverted from wells. The audit may be performed by an upper-level water operator or a professional service, following guidelines set forth by the American Water Works Association (AWWA), and could be funded by rate payers or through grant(s). Table 9 presents water balance categories for a water system, according to AWWA terminology. AWWA provides a free spreadsheet-based water audit tool (https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control/Free-Water-Audit-Software), which is in use by numerous communities in New Mexico and is commonly accepted by the NMOSE.

		billed outhorized a	billed metered	
	authorized	omed aumonzed "	billed unmetered	revenue
	deliveries	unhilled outhorized b	unbilled metered	
		unomed autionzed	unbilled unmetered	
			unauthorized	
total water		apparent losses <sup>c</sup>	customer metering inaccuracies	
diverted			systematic data handling errors	non-revenue
	water losses		leakage on transmission and/or distribution lines	
		real losses <sup>d</sup>	leakage and overflows at Utility storage tanks	
			leakage on service connections	

 Table 9. American Water Works Association water balance

<sup>a</sup> examples include metered deliveries for residential, and industrial, commercial, and institutional (ICI) use

<sup>b</sup> examples include metered main flushing, sewer cleaning, potable well flushing, non-potable production

<sup>c</sup> examples include theft and vandalism, customer metering inaccuracies, and data handling errors

<sup>d</sup> examples include line leakage, and storage tank leakage and overflow

A water loss reduction plan should be prepared based on the water system audit. The AWWA has set an industry standard goal of less than 10 percent for water losses (AWWA, 1996). As mentioned in Section 7.2, it may be reasonable to assume that water losses represent about 20 percent of total diversions; thus, there may be an opportunity for significant water savings by reducing water losses. The water system audit would identify and quantify sources of water losses, and a water loss reduction plan would identify how to reduce water losses in the future. In the water customer survey, a number of customers commented that the City should prioritize infrastructure maintenance and upgrades to reduce water losses in order to conserve water (see Section 2.4).

#### 8.2 Evaluation of Water Rate Structure

As recommended in the City's Comprehensive Plan (2015), a water rate study should be conducted to help determine whether rates are competitive with other communities and whether they adequately cover costs for maintenance and updating of the utility systems. An evaluation of the City's water rate structure should be conducted after two full years of monthly data collection of metered water deliveries data (see Section 8.1). Although City ordinances allow water rates to be automatically adjusted to conform to periodic CPI adjustments, the evaluation should consider the existing rate structure, compare it to those for other water systems in the region, and determine whether the existing structure is effective in discouraging wasteful water use. As part of the evaluation, it is recommended that the City review metering and pricing of bulk water provided to nearby oil and gas and refining operations, which could help offset costs associated with maintenance and development of supply to meet existing and future demand.

#### 8.3 Infrastructure Improvements

The City's current water capital appropriations that are open and that the City is currently acting on include \$70,000 to design the Northwest water tower, \$807,629 for downtown water line replacement (recently completed), \$423,000 for downtown historic improvements that are also being used for Main Street water line replacement, and \$352,000 for wells and water system construction. The City has also implemented a major corrective action plan for their wastewater system, and upgrading SCADA communications and meters, including three meters for water provided to nearby oil and gas and refining operations.

The City's Comprehensive Plan (2015) recommends the development of a utilities master plan or asset management plan to guide long-range water capital improvements and financing. Infrastructure improvements for consideration should include continuing to replace older distribution lines, replacing older wells that produce excessive amounts of sediment, and continuing new meter installation program for unmetered uses, and meter replacement program.

#### 8.4 Evaluation of Water Reclamation

It has been estimated that the City reclaims about 840 ac-ft/yr (0.75 MGD) of wastewater to irrigate non-food crops at the City farm. Treatment of reclaimed water should be evaluated in order to determine whether additional treatment would allow for more flexibility in the use of reclaimed water, thereby reducing total groundwater diversions. If wastewater treatment could be implemented to bring the quality of the reclaimed wastewater to Class 1B (suitable for uses in which public exposure is likely), and additional infrastructure developed, the reclaimed water could be used for irrigation of City parks, ball fields, and cemetery, and Chaparral Lake. A strong majority of water customers who responded to the customer survey agreed that recycled water should be used to irrigate parks and sports fields (see Section 2.4).

If the quality of the reclaimed wastewater could be brought to Class 1A (highest quality wastewater and potential to be most broadly utilized except for direct consumption), it could be used for irrigation of food crops. If nearby oil and gas and refining operations do not require potable water, it may be that reclaimed water could replace potable water for the provision of bulk water to these operations.

#### 8.5 Emergency Water Restrictions Ordinance

Improvements may be made to the City's Emergency Water Rationing Ordinance. The City may consider an approach in which water use restrictions are triggered based on the level of water emergency. In addition to climatic conditions, plant breakdown, and capacity of the water treatment plant, which are already listed as factors that could contribute to a water emergency, storage tank levels and well or pump failures could also be included as factors that define a certain level of water emergency.

A preventative component could be added that would allow the City to secure back-up equipment based on vulnerabilities and system components prone to failure such as booster pumps that may not have back-up, and pump equipment, materials, and motors for wells that may not have back-up, and failure of which could lead to significant reduction in supply to the system or distribution to specific zones. In some cases, it may not be possible to replace these items timely in case of failure.

#### 8.6 Water Conservation Ordinance

Although the City's Water Service System Ordinance prohibits the waste of water, the City does not have a water conservation ordinance. In many New Mexico communities, it is common to have an ordinance in place prohibiting outdoor landscape irrigation between 10 am and 6 pm, and limiting outdoor watering to even days of the month for even street addresses, and odd days of the month for odd addresses. This rule promotes water conservation by limiting evaporation and helps manage peak demand. The majority of water customers who responded to the customer survey would consider supporting this type of landscape watering schedule (see Section 2.4).

Among the water customers who responded to the customer survey, very few have xeriscaped yards, and a majority indicated that they would be willing to consider modifying landscaping to reduce water use. Some were unfamiliar with the term "xeriscaping." Some New Mexico communities have developed educational programs, City "lead-by-example" programs, or demonstration gardens to promote xeriscaping and water-wise approaches to gardening and landscaping. One successful example is the City of Las Cruces' Lush & Lean Workshops (https://www.las-cruces.org/1288/Lush-Lean-Workshops).

It is also common to have an ordinance with water-conserving requirements for new construction including low-flow showers, taps, toilets, and appliances, and landscaping that promotes water conservation and reduction of stormwater runoff. Mulching, zoning plantings, amending soil, xeriscaping, and efficient irrigation design are examples of landscaping techniques that could promote water conservation in Lovington. A majority of water customers who responded to the customer survey agreed that a landscaping ordinance should be adopted for new developments to minimize water use (see Section 2.4). Hot water recirculating systems should also be considered as a requirement for new construction.

The City's Comprehensive Plan (2015) indicates that water harvesting regulations can reduce the amount of runoff from developed areas and retain runoff to water on-site vegetation. Rainwater barrels, on-site detention or retention, rain gardens, and planted roadside ditches or medians that collect and hold water are all examples of harvesting that could be effective in Lovington. Therefore, the City may want to consider a water harvesting component for the water conservation ordinance. It should be noted that in some cases, water customers who responded to the customer survey were not familiar with the term "rain harvesting," so education and information promoting these types of practices may be a wise first step prior to regulation.

### 9.0 WATER DEVELOPMENT PLAN IMPLEMENTATION

### 9.1 Implement Water Conservation Plan

The City should implement the components of the Water Conservation Plan described in Section 8.0, above. Data on water diversions and deliveries will allow the City to quantify nonrevenue water and water losses, prepare a water system audit, evaluate water rates, and identify ways to minimize water losses. These data should be used to make water-supply management decisions to meet water demands over the 40-year planning period. Evaluation of treatment of reclaimed water will help determine whether additional treatment would allow for more flexibility in the use of reclaimed water, thereby reducing total groundwater diversions. Creation of a Water Conservation Ordinance and improvements to existing ordinances could result in additional conservation.

### 9.2 Develop Water Utility Master Plan

As recommended in the City's Comprehensive Plan (2015), the City is working towards a water utility master plan to guide long-range water capital improvements and financing, and additional ICIP projects to minimize water losses. Information provided in a recent article emphasized the need for a master plan (Cunningham, 2022). The article reported that the City's current SCADA system is aging and has been having problems such as failure of automated alarms and shutoffs leading to water losses from situations like overflowing water storage tanks. Thus, the City is working to upgrade the SCADA system. The article also indicated that the City's active supply wells are operating almost continuously to meet current peak demand during summer months, and the City will be rehabilitating some wells to address well capacity issues. Many of the currently active wells were drilled in the 1960s and may eventually need to be replaced. Sand production has been a problem in supply wells, and has been increasing operational and maintenance costs. Where sand has caused issues with metering, the City is looking into a type of meter with fewer moving parts that will be more resistant to issues with sand. Issues addressed in a master plan may include:

- Well rehabilitation and replacement to maintain supply and meet current demand
- Development of new wells or well fields to meet future demand
- SCADA upgrades
- New meter installation program for unmetered uses, and meter replacement program
- Design considerations to minimize and manage sand production
- Replacement of older distribution lines

### 9.3 Implement Groundwater Level Monitoring Program

The City is working towards implementation of a groundwater level monitoring program in order to monitor non-pumping and pumping water levels in City well fields, identify any short-term and/or long-term water-level trends, and update estimates of remaining saturated thickness in the vicinity of City well fields over the 40-year planning period. Groundwater level monitoring data would be used to make water-supply management decisions to meet water demands over the 40-year planning period.

The groundwater level monitoring program should include active supply wells and nearby inactive wells. When collecting water-level measurements, the measuring point should be noted, and it should be noted whether the well was pumping at the time of the measurement, and the corresponding instantaneous pumping rate. Measurements should be taken on a monthly basis, or quarterly basis at a minimum. Appendix K includes forms for recording water-level data, water-meter readings, and instantaneous pumping rates.

Any time a pump is pulled for well maintenance or rehabilitation, there is the opportunity to install a sounding tube alongside the pump drop pipe that will allow for access for water-level measurements. The sounding tube should be at least 1-inch inside diameter PVC set to the top of the pump.

#### 9.4 Update 40-Year Water Development Plan and Conservation Plan

Based on results of implementation of the Water Conservation Plan described in Section 8.2 and the Groundwater Level Monitoring Program, the 40-Year Water Development Plan and Water Conservation Plan should be updated within 10 years of the current study. The updated 40-Year Plan would include new data on water diversions and deliveries, water system audit results, evaluation of the water rate structure and water reclamation, and water-level trends in active supply wells and nearby inactive wells. The updated 40-Year Plan would also reference any updated or new ordinances related to water conservation.

#### 9.5 Reactivate Well Field within City Limits

Although the City's currently-active supply wells are located in the well field southeast of the City, the City has numerous inactive supply wells within the City limits. These wells may have been taken out of service years ago due to concerns about potential for contamination and diminished aquifer saturated thickness within the City limits. However, the majority of NMED/PSTB leaking

petroleum sites have now been designated as no-further-action. In addition, the lack of recent pumping within the City limits has slowed the rate of water-level decline, and it appears that adequate saturated thickness remains (see Table 1). Therefore, it may be advantageous for the City to evaluate the potential to reactivate the well field within the City limits. This would involve evaluation of the condition of existing wells, the potential to replace existing wells if necessary, and production rates for the reactivated well field.

#### 9.6 Acquire and Transfer Water Rights

Water demand projections, which take into consideration a total GPCD goal of 210 GPCD, potential future commercial and industrial demand, and a 10-percent pollution control safety factor, indicate the need for up to 394 ac-ft/yr in additional rights. To meet future demand, the City may seek to acquire water rights in the area and apply to change purpose of use of those rights to municipal use, or may seek to acquire and transfer rights to City-owned lands or lands to be purchased by the City (change in purpose of use and change in point of diversion).

The City may also consider City-owned lands or lands to be purchased by the City for the transfer of its existing water rights and permits, based on the risk of groundwater contamination in their current locations. If the City transfers existing rights to an alternate location, the refinery may want to take over City wells (but not the City-owned rights) in the southern well field.

Any property owned by the City, or property that may become available to the City for potential water rights acquisition or transfer, should be evaluated in terms of the current and projected aquifer saturated thickness, Basin Guidelines allowable average drawdown criteria, and potential sources of contamination. Complete analysis of potential water rights transfer(s) would need to consider the "move-from" locations of the rights to be transferred as well as the "move-to" locations, and would also need to include an analysis of drawdown impacts on neighboring wells.

It may be advisable for the City to begin the process of identifying properties and water rights, and potential to transfer rights as soon as possible, as aquifer saturated thickness declines over time, and other entities continue to file applications to transfer rights, thereby making it increasingly difficult over time to transfer rights under the Basin Guidelines. Preliminary review of Figures 4 and 6 would suggest that the area west of the City's southern well field, in Sections 32 and 33 of Township 16 South, Range 36 East, has relatively high projected aquifer saturated thickness and few potential sources of contamination. This could be a good location for transfer of water rights.

## 9.7 Evaluate Potential for Aquifer Storage and Recovery

Reclaimed wastewater would be a potential source of water for an aquifer storage and recovery (ASR) project. ASR is a process in which excess water is stored in aquifers and later recovered via groundwater supply wells. Preferred injection locations maximize storage and limit losses, such as to the regional aquifer, or pumping by other water rights holders. Water may be injected directly into the aquifer using existing or purpose-built wells. Alternatively, water may be allowed to infiltrate from above the water table through vadose zone infiltration basins. Excavations for infiltration basins would need to extend below the caliche, and could be partially backfilled with appropriate filter gravel.

The New Mexico Environment Department Ground Water Quality Bureau (NMED/GWQB) and the NMOSE are the regulatory agencies involved with reuse and ASR projects. The regulations for performing ASR are described in New Mexico Administrative Code (NMAC) 19.25.8. The NMED/GWQB regulates discharges to the ground surface and groundwater per the NMAC 20.6.2. A Notice of Intent to Discharge must be filed before any discharge is made. A Discharge Permit must be obtained for all discharges into the groundwater system, and many discharges to the surface.

The New Mexico State Water Plan indicates the State's support for the development and permitting of ASR projects as a water supply and demand strategy (NMISC, 2018). On a national level, U.S. Environmental Protection Agency and Department of Energy have indicated support for water reuse with the objectives of water security, sustainability, and resilience, while acknowledging significant challenges such as protection of public health, the environment, and protection of end use quality and needs (EPA, 2019). However, the State of New Mexico's current regulatory framework poses major challenges that may discourage ASR as an approach for several reasons:

- The State requires discharge permits issued for ASR projects to meet groundwater discharge water quality standards set forth in NMAC 20.6.2.3103.
- Water injected directly into the aquifer must meet State primary drinking water standards, per the Underground Injection Control section in the Water Quality Control Commission Regulations (NMAC 20.6.2.5000). This level of water treatment for recharge water can be cost-prohibitive.
- If the existing concentration of any water contaminant in groundwater is in conformance with the discharge standard (NMAC 20.6.2.3103), degradation of the groundwater up to the limit of the standard is allowed; however, if the existing concentration of any water contaminant in groundwater exceeds the standard, no further degradation of the groundwater beyond the existing concentration is allowed.
- Extremely comprehensive demonstrations and pilot testing, as may be required, can also be cost-prohibitive.

An NMOSE permit is required in order to retain the ownership of water rights. The costs for performing the work to submit a permit the NMOSE are very high, and the process is quite long. If injection wells, or infiltration basins are installed within an existing well field where the water can be recovered solely by the City, the ownership of the water is a not a real issue. This is because wells of other ownership cannot recover the water, and the aquifer is still maintained by the infiltrated water. In this case, only a permit from the NMED would be required.

In light of the challenges posed by the current regulatory framework, infiltration using vadose zone infiltration basins likely represents a lower-cost and lower-maintenance option than direct injection. The NMED generally requires water discharged at the surface, such as into an infiltration basin, to be treated to the less-stringent groundwater discharge standards. However, it may be more difficult to prove successful entry of this water into the aquifer if the City wants to retain ownership of the water via a permit from the NMOSE

El Paso Water Utilities has a number of infiltration basins that are used to return thousands of acre-feet per year of water to the regional aquifer. Currently, they are also developing infiltration basins that will be water features along hiking and biking trails. These types of water features and paths are used to enhance the appearance of the basins, and increase the quality of life for the citizens.

An ASR feasibility study should include evaluating areas where proposed 40-year drawdowns are projected to be the greatest and existing or proposed City wells can easily recover the water. The feasibility study should include evaluation of the percentage of water that could potentially be recovered versus water lost to the regional groundwater system or recovered by other nearby users. Following feasibility studies, site-specific studies would be crucial for a proposed reclaimed wastewater ASR project, in order to (1) determine whether the water can be successfully returned to the water table and recovered for later use, considering both physical return of the water and NMOSE accounting, and (2) determine whether the proposed water treatment and aquifer-return approach is protective of environmental and human health standards.

## 9.8 Schedule for Implementation of Plan

The City has developed a preliminary schedule for implementing the plan (see Table 10). The schedule is subject to change as funding becomes available for implementation. Provided below is the initial proposed implementation schedule.

component of plan	schedule for implementation
water conservation ordinance	Draft in 2023 and adopt in 2024; revisit ordinance at least every 10 years
emergency water restrictions ordinance	Draft improvements to existing ordinance in 2023 and adopt in 2024; update as needed
evaluate water reclamation	2023: Begin seeking funding for engineering study to evaluate potential for additional treatment of reclaimed water
Water Utility Master Plan	2023: Work with Professional Engineering firm(s) familiar with the City system to apply for funding for the plan and plan completion
infrastructure improvements	2023: Begin seeking funding for distribution line replacement program, and well replacement program
water level monitoring program	2023: Equip wells with sounding tubes as pumps are replaced or other work is being performed. Collect non-pumping water levels, pumping water levels and corresponding pumping rates.
meter installation	Replace broken meters, and install meters at all parks and other unmetered locations by end of 2024; install new meter for bulk water sold to oil and gas and refining operations
evaluate water rate structure	Complete by end of 2025 after all uses are metered; update every 10 years
data collection and water system audit	Complete by end of 2025 after all uses are metered
Update 40-year plan	2032: Update 40-year water plan
reactivate City well field	2030-2035: Evaluate and implement based on water levels in southern well field, and potential contamination in well field
acquire and transfer additional water rights	Evaluate predicted demands in 2032 as part of 40-year water plan update. Obtain additional rights if conservation measures, water reuse, and infrastructure repairs do not reduce GPCD use to meet projected demands.
aquifer storage and recovery	Consider implementation schedule after evaluation of water reclamation is completed

## **10.0 FUTURE WATER-SUPPLY DEVELOPMENT ALTERNATIVES**

### **10.1 Desalination**

Desalination of brackish or saline groundwater from deep aquifers in the Lea County Underground Water Basin could create usable water resources. Costs to desalinate brackish water are proportional to the TDS concentrations, and increase sharply for water with TDS concentrations over 10,000 mg/L. The majority of deeper groundwater resources in the Permian-age rocks underlying the Basin have TDS concentrations over 10,000 mg/L (JSAI, 2004 second draft).

In addition to costs related to permitting, developing deep brackish wells, advanced water treatment and infrastructure, and monitoring, the costs related to management and disposal of reverse osmosis (RO) concentrate are significant for an inland desalination system. The principal RO concentrate disposal options currently available for an inland application such as City of Lovington include:

- Deep well injection: This option has been utilized by El Paso Water in conjunction with their desalination plant. This may be an option for City of Lovington, as a geologically-suitable subsurface aquifer that is brackish or otherwise unsuitable for potable water supply is likely available for injection. This option is commonly used by the oil and gas industry.
- Evaporation ponds (with or without a greenhouse): Involves discharge of RO concentrate to shallow, lined ponds. Required surface area can be reduced using greenhouses. Solidified constituents typically are disposed of in hazardous-waste landfills.

## **10.2 Direct Potable Reuse**

Direct potable reuse (DPR) represents a potential future water-supply alternative for the City in which advanced treated wastewater could be used as a water source to augment the City's groundwater supply. The timing of implementation of DPR as a water-supply alternative would be based on projected increases in demand, and implementation of other, potentially more feasible alternatives.

NMED has yet to develop guidelines for DPR project permitting, and the agency is currently being guided by recommendations provided by the National Water Research Institute (NWRI, 2016). Rigorous pilot testing would be an important aspect of the permitting process for DPR in New Mexico. In terms of advanced water treatment, the basic requirement for a DPR project would be to control water-quality constituents to meet all U.S. Environmental Protection Agency (EPA) and state drinking water maximum contaminant levels (MCL) and other requirements that apply to public drinking water supplies in New Mexico. NWRI (2016) identifies pathogens as the most important design and operating concern for DPR systems. In addition, other unregulated chemicals of public health interest may be identified by the state that warrant the establishment of additional water quality or performance specifications.

For DPR projects, water-quality monitored is rigorous and extensive, performed at numerous (and sometimes redundant) points in the advanced treatment process, continuously or at specified intervals depending on the monitoring point and constituent.

Advanced treatment facilities for DPR have generally included RO and several types of filtration, and may include oxidation or ozonation. As noted for desalination in Section 10.1, the costs related to management and disposal of RO concentrate are significant, and are in addition to the significant costs related to advanced water treatment and infrastructure, and monitoring.

Public acceptance of DPR is critical for implementation of a DPR project. According to research funded by WateReuse, public acceptance of potable reuse is no less important than technical merit (TWDB, 2015).

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**APPENDICES** 

Appendix A.

Water planning survey results

Appendix A.	City of l	Lovington <b>w</b>	vater customer	survey result	ts, in terms	of percenta	ge of responses
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Question 1: For each statement please indicate your amount of concern	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
water supply is scarce	27	32	29	10	2
water supply is susceptible to contamination	22	42	25	10	1
water should be conserved to ensure future supply	35	37	23	2	2
ongoing droughts have negatively affected water supply	37	36	21	4	2
water is being pumped faster from the aquifer than it recharges	31	30	37	2	1
recycled water should be used to irrigate parks and sports fields	58	33	6	2	2
a landscaping ordinance should be adopted for new developments that minimizes water use	38	27	25	8	2

Question 2: Please indicate if your household conserves water in the following ways	Yes	No
I have low flow toilets	70	30
I have low flow shower heads	59	41
I have a hot water recirculating system	10	90
I have an evaporative cooler	6	94
I water a lawn 3 or more days per week	29	71
My yard is xeriscaped	13	87

Question 3: I am willing to consider implementing the following water conservation measures	Yes	No
replace older appliances with high efficiency appliances	54	46
install low flow or ultra-low flow toilets	56	44
install low flow shower heads	53	47
install a hot water recirculating system	29	71
modify landscaping to reduce water use	58	42
invest in a rain harvesting system	38	62
support a landscape watering schedule with odd/even addresses on odd/even calendar days	61	39
limit landscape water to the morning hours prior to 10 am and evening hours after 6 pm	81	19

Appendix B.

Hydrographs for wells monitored by U.S. Geological Survey near City of Lovington, Lea County, New Mexico



JOHN SHOMAKER & ASSOCIATES, INC.









JOHN SHOMAKER & ASSOCIATES, INC.



JOHN SHOMAKER & ASSOCIATES, INC.



Appendix C.

City of Lovington water-supply wells

## Appendix C. City of Lovington water-supply wells

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NMOSE	woll	woll	NMOSE		supply	data	Λ, ΠΤΜ83	т, ПТМ83		donth	diamotor	intorval	wator	pumping water level	viold		
woll No	namo	namos			supply	drillod	0111103, m	0 T 19103,		deptil,	ulameter,	ff	water,	water level,	yieid,	Q/S,	notos
	Itaille	names		The NOS.	weii	8/25/106/	654040	3647088	165 36E 03	218	14	11	72		gpin	gpin/it	notes
L-4000-0-7			L-1703	1-208-5 1-208-		0/20/1904	004949	3047000	103.30E.03	210	14		12				
1-208-000				POD6 1-208-		6/12/1961	655044	3646803	165 36F 03 413	216	14	76-216	78	120	300	71	
1-4058			I -455-POD2	I -455-A		6/4/1952	653331	3647053	16S 36F 04	127	14	70-210	58	120	450	7.1	
L-4058-S-5			L-1702			11/16/1955	653331	3647053	16S.36E.04	212	13	80-208	58		600		
L-4058-S-9			L-766-POD2	L-766-AA		2/5/1958	653331	3647053	16S.36E.04	136	12	66-136	70	85	450	30.0	
L-4058-S-6			L-1702-S			6/7/1958	652814	3647354	16S.36E.04.132	146	14	67-146	67		550		
L-208			L-208-POD8			6/15/1957	653560	3646854	16S.36E.04.4133	118	12	78-118	68	82	200	14.3	
L-4058-S-3		Well 3, Park	L-208-POD4	L-1133-S		2/27/1953	653436	3646367	16S.36E.04.433	196	13	90-110; 150-190	65	82	400	23.5	
L-4058-5-8			L-1704-POD4	L-1704		6/24/1957	653038	3040155	165.36E.09.121	120	12	80-120	80		200		
				L-200, L-400A &		7/0/1050	652047	2645072		105	16		E A	<u>c</u> e	400	26.4	
L-4058-5-4			L-208-POD3	L-1133-Comp-S		10/20/1052	654252	3045972	165.36E.09.223	105	10	62 210	54	00	400	30.4	
L-4030-3-2			L-200-POD5	L-1133		10/29/1900	655063	3645703	103.30E.10.11 16S 36E 10.2	213	13	87 102	62 50	00	800	21.7	
1-70-5						1/12/1053	655263	3645703	16S 36E 10 232	102	12 38	136-102	50		500		
L-70-0		City Park				10/14/2011	655438	3645880	16S 36E 10 2411	200	12.00	100-200	100		200		
L -4058-S-12			L-4058-POD1			2/6/1963	655665	3645801	16S 36F 10 242	200	14	88-202	65	80	450	30.0	
L-70-S-2			L-4058-POD3			9/22/1998	655471	3645397	16S.36E.10.421	215	5	152-212	56.6	60.1	60	16.9	
L-4058-S			L-455-POD4	L-455-A-S		7/12/1957	654477	3644367	16S.36E.15.114	130	12	90-130	65		500		
L-53-A-A	Well 1		L-53-POD4	L-53-S		10/9/1959	658206	3640632	16S.36E.25.322	126	16		107		1600		
L-4058-S-17	Well 11				Х	4/29/1965	657863	3639984	16S.36E.25.334	266	16	50-246	54	75	600	28.6	
L-4058-S-14	Well 2				Х	5/6/1965	658742	3640404	16S.36E.25.423	260	16	50-240	52	83	1000	32.3	
L-4058-S-27	Well 27				Х	10/4/2011	657287	3640075	16S.36E.26.444	225	10.75	155-215	95.3	130	400	11.5	
L-4058-S-30	Well 30				Х	2011	657060	3639289	16S.36E.35.232	240	12.75	170-230	95	200	200	1.9	PCW received 1/27/12
L-4058-S-31	Well 31				Х	10/11/2011	657055	3639116	16S.36E.35.234	230	10.75	160-220	94.8	126	400	12.8	
L-4058-S-24	Well 14				Х	4/7/2000	657840	3639813	16S.36E.36.112	257	12.75	89-257	104	112	400	50.0	
L-4508-S-21	Well 15		-		X	1/28/1981	65////	3639583	16S.36E.36.114	251	12	70-251	82	95	500	38.5	
L-4508-S-25	Well 18				X	4/13/2000	657843	3639440	16S.36E.36.132	256	12.75	96-256	109	118	500	55.6	
L-4058-5-18	Well 12				X	5/1/1905	05/804 659796	3039204	105.30E.30.134	200	10	50-255	52	83	800	25.8	
L-4058-S-15		Wall 17			X	3/20/1006	65880/	3630301	103.30E.30.223	200	10	30-240 84-114	04	02 120	20	0.7	pollution control well
L-4000-0-20(1)	1200-1					10/29/2005	658993	3639200	16S 36F 36 244	237	13	157-237	30	120	20	0.7	
L -4508-S-22	Well 16					2/25/1981	657857	3638883	16S 36E 36 31	239	12 75	161-239	74	84	500	50.0	
L-4058-S-19	Well 13				х	5/3/1965	657862	3638513	16S.36E.36.334	245	16	50-225	52	84	800	25.0	
L-1702. L-1703 &																	
L-1704-Comb-A			L-4058-POD2			3/26/1973	658995	3638988	16S.36E.36.422	248	12.75	78-228	62	100	800	21.1	
L-4058-S-16	Well 10					4/6/1973	658968	3639037	16S.36E.36.422	235	12	65-215	63	100	800	21.6	
L-4984-S-19	Well 4		L-4984-S		Х	5/25/1965	659590	3640008	16S.37E.30.343	240	12	50-220	55	82	1000	37.0	
L-1718	Well 3					3/31/1954	659118	3639796	16S.37E.31.1	150	16	60-150	45	76	1400	45.2	not in service
L-4984-S-2	Well 5		L-5060		Х	6/5/1965	659638	3639293	16S.37E.31.1	240	12	50-220	51	72	1000	47.6	
L-4984-S-3	Well 7		L-4957		Х	5/29/1965	660525	3639652	16S.37E.31.223	220	12	50-200	42	65	1000	43.5	
L-1719	Well 6		L-1718-POD2			5/24/1996	659909	3639045	16S.37E.31.23	214	12.75	93-212	85	110	600	24.0	not in service/abandoned
L-4984-S-4	Well 8		L-5458		Х	6/2/1965	660454	3638630	16S.37E.31.441	240	12	50-220	53	80	1000	37.0	
L-5486-S	Well 6A		L-5486-POD2		Х	5/1/1992	660114	3639319	1/S.36E.01.112	232	12.75	82-232	105	136	1000	32.3	
L-5486	Well 21				Х	6/4/19/3	657865	3637736	1/S.36E.01.132	225	12.75	170-220	62	102	800	20.0	
L-0400-0-23	weil 17					2/0/1056	00/004	3030101	179 265 02 244	150	16	16 150	20	64	1100	10.0	
L-2401						0/2/1055	656800	3637/33	175.30E.02.244	145	10	40-150	38	64	1100	42.3	
	L Co Office of t	l he State Engine	l or			9/2/1900	000090	JUJ14JZ	170.000.02.411	140	1	11-92	30	04	1100	42.3	L
UTM83 - Universal T T.R.S.qqq - township gpm - gallons per mir Q/s - specific capacit gpm/ft - gallons per m	ransverse M o, range, sec nute ninute per fo	lercator map pro tion, quarter qua ot of drawdown	jection North Ame irter quarter	erican Datum of 1983													

Appendix D.

City of Lovington water-quality summary

## Appendix D. City of Lovington Water-Quality Summary

Table D1 presents water-quality results for City of Lovington supply wells. These results are relatively recent, from 2012 and 2013 (except in the case of Well 18, the results are from 2002). More recent water-quality results collected for drinking water compliance have been collected from the water system entry point or booster pump facility, and not from individual wells. The groundwater supply is of good quality, and can generally be described as calcium-bicarbonate type water. Hardness ranged from 200 to 510 milligrams per liter (mg/L), which is considered very hard. The most common problems associated with hard water is the precipitate, or mineral buildup, that forms in hot-water heaters and in and on plumbing fixtures, and an increase in soap consumption for washing clothes, dishes, and showering. The total dissolved solids (TDS) concentration in Well 13 was above the New Mexico Environment Department, Drinking Water Bureau (NMED/DWB) secondary (aesthetic-related) standard. NMED/DWB secondary standards are related to aesthetic qualities such as taste and odor. Nitrate concentrations in selected wells sampled on November 27, 2013, were below the NMED/DWB primary (health-related) drinking water standard, but appear to be somewhat elevated, and may be related to point source or nonpoint source pollution associated with agriculture. A comparison of nitrate concentrations for samples collected from Wells 9, 12, 13, 14, and 15 over the past 20 years indicates an average increase of 3.7 mg/L. The sample collected from Booster Pump Facility #1 in 2020 had a lower nitrate concentration of 2.95 mg/L. Naturally-occurring nitrate concentrations are typically less than 2 mg/L.

parameter	units	Well 9	Well 12	Well 13	Well 14	Well 15	Well 18	Well 27	Well 31	Booster Pump Facility #1	NMED/DWB standard
sample date		11/27/13	11/27/13	11/27/13	11/27/13	11/27/13	3/14/02	10/30/12	10/30/12	2/3/20	
reference		City	City	City	City	City	DWW	DWW	DWW	DWW	
pH (lab)	pH units	7.3	7.4	7.4	7.5	7.4	7.48	7.66	7.61	-	6.5 to 8.5 <sup>1</sup>
bicarbonate	mg/L	166	161	181	161	161	202	-	-	-	ns
hardness as CaCO3	mg/L	320	300	510	200	270	230	-	-	-	ns
calcium	mg/L	88	80	125	50	78	76.8	-	-	-	ns
magnesium	mg/L	24	24	48	18	18	9.2	-	-	-	ns
sodium and potassium	mg/L	28	23	50	15	1	43	-	-	-	ns
sulfate	mg/L	50	59	90	58	57	64.8	61	83	-	ns
chloride	mg/L	50	40	114	28	57	46.8	25	33	-	250 <sup>1</sup>
iron	mg/L	0.15	0.15	0.15	0.15	0.15	< 0.1	-	-	-	0.31
arsenic	mg/L	-	-	-	-	-	0.007	-	-	0.006	0.010
TDS	mg/L	406	387	607	331	372	-	362	406	-	500 <sup>1</sup>
specific conductance	µS/cm	-	-	-	-	-	608	-	-	-	ns
nitrate	mg/L	6.75	6.50	7.00	5.75	6.00	-	-	-	2.95	10

Table D1. Summary of selected water quality samples for City of Lovington water-supply wells

<sup>1</sup> Secondary (aesthetic-related) standards

NMED/DWB - New Mexico Environment Department Drinking Water Bureau DWW - NMED Drinking Water Watch, https://dww.water.net.env.nm.gov// values in **bold** exceed the NMED/DWB standard ns - no standard µS/cm - microSiemens per centimeter mg/L - milligrams per liter

TDS - total dissolved solids

Appendix E.

Potential point source pollution sites in the vicinity of City of Lovington wells

The table below provides a list of potential point sources of pollution based on compilation of sites on file with NMED and OCD. The list of NMED discharge permits includes the City's wastewater treatment plant and numerous dairies. The NMED/PSTB list of active leaking petroleum sites lists five active sites within the City limits.

The OCD has documented numerous spills and leaks of primarily crude oil and produced water, as well as fuels, condensate, brine water, and produced water associated with oil and gas operations near City wells. Of particular concern are the following:

- Navajo Lovington Refinery (OCD Abatement Plan AP-110). Leaks and spills of crude oil, crude-naphtha mix, gas oil, and waste water have resulted from ongoing normal operations.
- Araho, Inc. site, a former injection well disposal facility (OCD Groundwater Discharge Permit GW-37). A large, lined waste holding pit, and 17,000 cubic yards of contaminated soil, were removed from the site in 2005.
- Historic spills and leaks of crude oil. Approximately ten entries in the OCD database indicate impact to groundwater from crude oil as a result of corrosion of pipelines or tanks, or equipment failure.
- Historic spills and leaks of produced water, where the contaminants of concern are chloride and TDS. Several entries in the OCD database indicate impact to groundwater from produced water as a result of equipment failure.

				lat	long	shp	ge	tion			
site name	type	ID	agency	WGS84	WGS84	twn	ranç	sec	incident number	well name	facility type
Lovington Sanitary Landfill (closed in 1992)	NMED/SWB		NMED	32 53 09.2	103 17 26.5						
Lovington WWTP	NMED DP (active)	DP-87	NMED	32 56 08.33	103 20 12.48						
Alexander Dairy	NMED DP (comb. w/DP-923)	DP-235	NMED	32 57 51.00	103 15 45.00						
Woods Dairy	NMED DP (inactive)	DP-888	NMED	33 02 13.00	103 11 33.00						
Faria Dairy	NMED DP (inactive)	DP-923	NMED	32 58 08.94	103 18 10.64						
Brand West Dairy	NMED DP (inactive)	DP-951	NMED	32 55 36.00	103 31 38.00						
Boyd Brothers Dairy	NMED DP (terminated)	DP-988	NMED	33 03 58.90	103 17 59.81						
Landmark Dairy/Doldersum	NMED DP (pending)	DP-1025	NMED	32 51 18.5	103 17 40.6						
Bos Dairy	NMED DP (active)	DP-1135	NMED	32 56 28.01	103 13 27.93						
Dixieland Dairy	NMED DP (active)	DP-1268	NMED	32 59 56.22	103 13 48.92						
Outlook Dairy	NMED DP (active)	DP-1302	NMED	33 02 14.19	103 12 35.18						
Brand West Dairy 2	NMED DP (active)	DP-1323	NMED	32 55 28.36	103 14 09.33						
KC Dairy	NMED DP (terminated)	DP-1376	NMED	32 50 08.69	103 17 06.19						
Rocky Top Dairy	NMED DP (pending)	DP-1559	NMED	32 49 51.37	103 12 36.12						
FINA 12 (Aggr Cleanup Completed, RP)	NMED/PSTB active	Facility #28020	NMED	32 56 37.6	103 21 00.1						
Allsups 19 (Cleanup, RP)	NMED/PSTB active	Facility #890	NMED	32 56 37.4	103 20 54.1						
Lovington 66 (Cleanup, RP)	NMED/PSTB active	Facility #1489	NMED	32 56 40.0	103 20 55.1						
Town & Country 125 ((Aggr Cleanup Completed, RP)	NMED/PSTB active	Facility #1931	NMED	32 57 16.9	103 20 54.0						
Lea Cty Electric Coop	NMED/PSTB active	Facility #29060	NMED	32 58 42.7	103 19 16.6						
Bell Gas 138	NMED/PSTB NFA		NMED	32 56 36.4	103 20 54.6						
Western Petroleum #8860, Lovington Bulk Plant SFS	NMED/PSTB NFA		NMED	32 56 27.9	103 20 56.0						
Lea Cty Motors	NMED/PSTB NFA		NMED	32 56 41.3	103 20 55.0						
Wilson Oil	NMED/PSTB NFA		NMED	32 56 43.7	103 20 55.1						
Baroid Drilling Fluids	NMED/PSTB NFA		NMED	32 55 46.0	103 20 42.3						
Circle K 859	NMED/PSTB NFA		NMED	32 56 38.8	103 21 16.5						
Boomers Truck Stop	NMED/PSTB NFA		NMED	32 59 21.0	103 19 03.1						
aband. service station	NMED/PSTB NFA		NMED	32 57 15.3	103 20 55.8						
Lea Cty Oil	NMED/PSTB NFA		NMED	32 59 25.0	103 19 02.3						
Lovington Keylocks	NMED/PSTB NFA		NMED	32 57 23.3	103 20 55.0						
McClains P&D Petroleum	NMED/PSTB NFA		NMED	32 56 00.2	103 20 55.0						
Lovington PD&FD	NMED/PSTB NFA		NMED	32 56 49.0	103 20 50.8						
Allsups 20	NMED/PSTB NFA		NMED	32 56 38.2	103 21 31.7						
Public Schools	NMED/PSTB NFA		NMED	32 56 23.0	103 20 59.4						
Araho, Inc.	OCD GW site	GW-37	OCD	32 51 49.2	103 18 03.9						
Pro-Kem, Inc.	OCD GW site, AP site	GW-202, AP-119	OCD	32 55 30.5	103 20 39.5						
Navajo Lovington Refinery	OCD GW site, AP site	GW-14, AP-110	OCD	32 52 43.0	103 18 04.4						
Plains All American TNM 97-04	OCD GW site	GW-	OCD	32 55 57.1	103 25 12.3						
Apollo Oil Co	OCD GW site	GW-36-0	OCD	32 52 00.3	103 19 19.8						
Plains Lovington Gathering WTI	OCD AP site	AP-96	OCD	32 51 55.9	103 17 07.6						
CS Cayler	OCD AP site	AP-52	OCD	32 52 03.8	103 17 16.4						
API 30-025-20833	OCD spill		OCD			17S	35E	28	nAPP2116770257	VACUUM GLORIETA EAST UNIT #003	
API 30-025-20711	OCD spill		OCD			17S	35E	32	nAPP2116234581	VACUUM GLORIETA EAST UNIT #007	
API 30-025-36866	OCD spill		OCD			16S	36E	20	nAPP2118726438	RUTH 20 #002	
DAVIS GAS PROCESSING CO	OCD spill		OCD			16S	37E	9	nAPP2214657587		
DCP A-9-6 line	OCD spill		OCD			16S	37E	8	nOY1728435865		
A-7-3 Line	OCD spill		OCD			16S	37E	32	nAPP2125731425		
API 30-025-36866	OCD spill		OCD			16S	36E	20	nAPP2118726438	RUTH 20 #002	
HOLLY ENERGY PARTNERS	OCD spill		OCD			16S	36E	36	nRM2009250299		
API 30-025-03783	OCD spill		OCD			16S	36E	36	nRM2003849891	SKELLY Q STATE #003	
Lovington Refinery	OCD spill		OCD			16S	36E	36	nOY1822234517		
Holly Energy Crouch pipeline	OCD spill		OCD			16S	36E	36	nOY1733347591		
Lovington Refinery	OCD spill		OCD			16S	36E	36	nOY1709036161		
API 30-025-27237	OCD spill		OCD			15S	35E	7	nOY1812440478	JAMES O'NEILL #001	
API 30-025-38867	OCD spill		OCD			15S	35E	7	nOY1735248031	ANTELOPE #001	
API 30-025-38867	OCD spill		OCD	1		15S	35E	7	nOY1801057914	ANTELOPE #001	
API 30-025-37975	OCD spill		OCD	1		15S	36E	17	nTO1431854073	CAUDILL WEST 17 FEE #001	
API 30-025-34591	OCD spill		OCD			16S	35E	15	nAPP2106141780	BOYCE 15 #001	
MAYFLY 14 STATE #5 TANK BATTERY	OCD spill		OCD			16S	35E	14	nDHR1913445231		
API 30-025-34500	OCD spill		OCD	1		16S	35E	2	nCH1827850988	TOWNSEND STATE #005	
API 30-025-02709	OCD spill		OCD			16S	35E	1	nCH1815552862	STATE B #004	
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JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

-14			incident	material	volume	volume	volume	volume			gw
Site name	operator	Incident type	date	spilled	spillea	recovered	lost	units	spill cause	spill source	Impact
Lovington Sanitary Landini (closed in 1992)										<u> </u>	
			-							<u> </u>	
Woods Dairy										<u> </u>	-
Faria Dainy										<u> </u>	-
Rand West Dain										<u> </u>	-
Boyd Brothers Dairy			-							<u> </u>	
Landmark Dairy/Doldersum										<u> </u>	-
Bos Dairy										<u> </u>	
Divieland Dainy										<u> </u>	
Outlook Dairy										<u> </u>	+
Brand West Dairy 2										<u> </u>	+
KC Dairy										<u> </u>	+
Rocky Ton Dairy											-
FINA 12 (Aggr Cleanup Completed RP)										<u> </u>	-
Allsups 19 (Cleanup RP)										<u> </u>	-
Lovington 66 (Cleanup, RP)											-
Town & Country 125 ((Aggr Cleanup Completed, RP)											-
Lea Cty Electric Coop											-
Bell Gas 138											-
Western Petroleum #8860. Lovington Bulk Plant SFS											-
Lea Ctv Motors											-
Wilson Oil											
Baroid Drilling Fluids											1
Circle K 859											1
Boomers Truck Stop											1
aband. service station											
Lea Cty Oil											1
Lovington Keylocks											
McClains P&D Petroleum											
Lovington PD&FD											
Allsups 20											
Public Schools											
Araho, Inc.											
Pro-Kem, Inc.											
Navajo Lovington Refinery											
Plains All American TNM 97-04											
Apollo Oil Co											
Plains Lovington Gathering WTI											
CS Cayler											
API 30-025-20833	331199	Other	6/15/21	Brine Water	35	34	1	BBL	Other	Well	No
API 30-025-20711	217817	Release Other	6/8/21	Brine Water	4	0	4	GAL	Other	Other (Specify)	No
API 30-025-36866	1092	Other	7/5/21	Condensate	0	0	0	BBL	Fire	Well	No
DAVIS GAS PROCESSING CO	191566	Other	5/11/22	Condensate	4	4	0	BBL	Corrosion	Pipeline (Any)	No
DCP A-9-6 line	705987	Produced Water Release	10/11/17	Condensate	10	7	3	BBL	Human Error	Pipeline (Any)	No
A-7-3 Line	36785	Natural Gas Release	10/13/15	Condensate	10	0	10	BBL	Corrosion	Pipeline (Any)	No
API 30-025-36866	1092	Other	7/5/21	Crude Oil	0	0	0	BBL	Fire	Well	No
HOLLY ENERGY PARTNERS	282505	Oil Release	3/25/20	Crude Oil	212	130	82	BBL	Equipment Failure	Valve	No
API 30-025-03783	330447	Oil Release	1/31/20	Crude Oil	12	10	2	BBL	Corrosion	Other (Specify)	No
Lovington Refinery	15694	Oil Release	7/9/18	Crude Oil	7	3	4	BBL	Equipment Failure	Pipeline (Any)	No
Holly Energy Crouch pipeline	282505	Oil Release	11/29/17	Crude Oil	45	35	10	BBL	Human Error	Pipeline (Any)	No
Lovington Refinery	296080	Oil Release	3/31/17	Crude Oil	7	5	2	BBL	Other	Other (Specify)	No
API 30-025-27237	151416	Oil Release	5/4/18	Crude Oil	60	50	10	BBL	Overflow - Tank, Pit,	I ank (Any)	No
API 30-025-38867	131559	Oil Release	12/18/17	Crude Oil	0	0	0	BBL	Equipment Failure	Well	No
API 30-025-38867	131559	Oil Release	12/18/17	Crude Oil	5	2	3	BBL	Equipment Failure	Well	No
API 30-025-37975	330539	Oil Release	11/14/14	Crude Oil	20	0	20	BBL	Corrosion	Tank (Any)	No
API 30-025-34591	1092		1/25/21	Crude Oil	120	0	120	BBL	Corrosion	Production Tank	No
MAYFLY 14 STATE #5 TANK BATTERY	240974	Produced Water Release	4/24/19	Crude Oil	4	0	4	BBL		Tank (Any)	No
API 30-025-34500	328449		9/13/18	Crude Oil	23	15	8	BBL	Equipment Failure	Separator	No
AMI 30-025-02709	102920	UII Release	6/1/18	Uruae Oli	136	U	136	RRL	Corrosion	Tank ( Any)	NO

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

				lat	long	shp	ge	tion			
site name	type	ID	agency	WGS84	WGS84	twn	ranç	sect	incident number	well name	facility type
API 30-025-31634	OCD spill		OCD			16S	37E	3′	1 nAPP2104630028	LOVINGTON PADDOCK UNIT #134	
API 30-025-21739	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	16S	37E	30	0 nRM2034453708	STATE Q #002	
API 30-025-21792	OCD spill		OCD			16S	37E	30	0 nRM2034455815	STATE Q #003	
API 30-025-21807	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	16S	37E	30	0 nRM2034533903	STATE Q #004	
HEP Lovington Pipeline and Terminal	OCD spill		OCD			16S	37E	31	1 nKJ1534838882		
	OCD spill		OCD			17S	35E	26	6 nAPP2213957732		
EVGSAU SATELLITE 1			OCD			17S	35E	19	9 nAPP2210950771		
						170	30E	34 21	2 nAPP2207331003		
					· · · · · ·	179	30E	24	1 nAPP2201143320		
						175	35E	29	nAPP2200043437		
						175	35E	20	1 nAPP2120036218		
						17S	35E	32	nAPP2125634309		
						17S	35E	33	3 nAPP2122371336		
LEGACY RESERVES OPERATING, LP			OCD		· · ·	17S	35F	35	5 nAPP2122260724		
API 30-025-26225						17S	35F	28	nAPP2123242125	FAST VACUUM (GSA) UNIT #002	
CONOCOPHILLIPS COMPANY			OCD			17S	35E	26	6 nAPP2115824205		
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	2 nAPP2103564128		
API 30-025-02979	OCD spill		OCD			17S	35E	32	2 nAPP2100449115	EAST VACUUM (GSA) UNIT #004	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	2 nRM2027962353		
API 30-025-02086	OCD spill		OCD		· · · · · ·	17S	35E	19	9 nRM2021328541	EAST VACUUM (GSA) UNIT #001	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	2 nRM2019933917		
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	2 nRM2017856312		
API 30-025-26519	OCD spill		OCD			17S	35E	- 33	3 nRM2014564602	EAST VACUUM (GSA) UNIT #005	
API 30-025-32219	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	17S	35E	33	3 nRM2008348428	EAST VACUUM (GSA) UNIT #007	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	2 nCE2003542701		
API 30-025-03008	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	17S	35E	34	4 nRH2003532478	EAST VACUUM (GSA) UNIT #002H	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	35	5 nRM2003534693		
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	19	9 nRM1935733118		
EVGSAU Well 2864-002	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	17S	35E	28	8 nRM1930958355		
ConocoPhillips EVGSAU CTB	OCD spill		OCD		· · · · · · · · · · · · · · · · · · ·	17S	35E	33	3 nRM1930848978		
	OCD spill		OCD			17S	35E	32	2 nRM1925659370		
EVGSAU SATELLITE 3			OCD			17S	35E	32	2 nOY1830935907		
PHILLIPS 66 NM 28 EAST GLORIETTA PIPELINE						175	35E	28	B nOY1827449098		
API 30-025-32219						175	35E	30	3 nOY1815239274		
API 30-025-20225						170	30E	20	$\frac{1011013237113}{10013237113}$		
API 30-025-02900 API 30-025-26658						175	35E	32	$\frac{2}{3}$ nOV1803031043	EAST VACUUM (GSA) UNIT #012	
API 30-025-21382						17S	35E	34	1 nOY1801748389		
ConocoPhillips EVGSALLCTB						17S	35E	33	nOY1800329215		
API 30-025-02879					· · ·	17S	35F	26	6 nOY1725753975	FAST VACUUM (GSA) UNIT #030	
API 30-025-26654			OCD			17S	35E	33	3 nOY1721345137	EAST VACUUM (GSA) UNIT #005	
API 30-025-26577	OCD spill		OCD			17S	35E	29	9 nOY1704044285	EAST VACUUM (GSA) UNIT #001	
API 30-025-02824	OCD spill		OCD			17S	35E	19	9 nKL1627945337	EAST VACUUM (GSA) UNIT #001	
VGEU East Battery	OCD spill		OCD			17S	35E	27	7 nKL1625827670		
API 30-025-02987	OCD spill		OCD			17S	35E	33	3 nJXK1609752883	EAST VACUUM (GSA) UNIT #029	
API 30-025-26388	OCD spill		OCD			17S	35E	32	2 nJXK1608450635	EAST VACUUM (GSA) UNIT #005	
API 30-025-26225	OCD spill		OCD			17S	35E	28	8 nKJ1603452629	EAST VACUUM (GSA) UNIT #002	
API 30-025-34702	OCD spill		OCD			17S	35E	15	5 nKJ1600726055	SOUTH SHOEBAR 15 STATE #002	
API 30-025-26652	OCD spill		OCD			17S	35E	32	2 nJXK1530637430	EAST VACUUM (GSA) UNIT #011	
API 30-025-02979	OCD spill	l	OCD		· · · · ·	17S	35E	32	2 nJXK1528944722	EAST VACUUM (GSA) UNIT #004	<u> </u>
API 30-025-26395	OCD spill	l	OCD		ļļ`	17S	35E	26	b nJXK1521626690	EAST VACUUM (GSA) UNIT #004	
API 30-025-26679			OCD		ļļ`	17S	35E	33	3 nKJ1516650966	EAST VACUUM (GSA) UNIT #002	
API 30-025-32844						1/5	35E	3	1 nKJ1513333641		
AMI 30-025-03008						175	35E	34	+ n101506255588		
API 30-025-2032 1 ADI 20.025-25760		<u> </u>				170	30E	<u>ح</u> ک	+ 1101506430213		
AFI 30-025-337 09 ABI 30 025 24237		l				170 170	30E	2	nTO1424150043		
AF1 30-023-24237 API 30-025-32062						179	35E	20	3 nTO1422039130		+
API 30-025-32002 API 30-025-38346	OCD spill				<u>├</u>	179	350	20	0 nTO1410100731		+
		1	000		I [	110	JJE	52			1

			incident	material	volume	volume	volume	volume			gw
site name	operator	incident type	date	spilled	spilled	recovered	lost	units	spill cause	spill source	impact
API 30-025-31634	4323	Produced Water Release	10/29/20	Crude Oil	1	0	1	BBL	Equipment Failure	Well	No
API 30-025-21739	181109	Release Other	10/16/20	Crude Oil	0	0	0	BBL	Other	Other (Specify)	No
API 30-025-21792	181109	Release Other	10/16/20	Crude Oil	0	0	0	BBL	Other	Well	No
API 30-025-21807	181109	Release Other	10/16/20	Crude Oil	0	0	0	BBL	Other	Other (Specify)	No
HEP Lovington Pipeline and Terminal	242939	Oil Release	12/14/15	Crude Oil	0	0	0	BBL	Other	Other (Specify)	No
EVLRP	217817	Release Other	5/5/22	Crude Oil	1	0	1	BBL	Corrosion	Pump	No
EVGSAU SATELLITE 1	217817	Release Other	4/6/22	Crude Oil	0	0	0	BBL	Equipment Failure	Well	No
CONOCOPHILLIPS COMPANY	217817	Release Other	2/27/22	Crude Oil	1	0	1	BBL	Equipment Failure	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	1/6/22	Crude Oil	0	0	0	BBL	Equipment Failure	Unknown	No
COG OPERATING LLC	229137	Produced Water Release	12/21/21	Crude Oil	7	0	7	BBL	Corrosion	Flow Line - Injection	No
CONOCOPHILLIPS COMPANY	217817	Release Other	10/25/21	Crude Oil	32	30	2	BBL	Human Error	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	10/12/21	Crude Oil	7	0	7	BBL	Corrosion	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	8/12/21	Crude Oil	1	0	1	BBL	Corrosion	Other (Specify)	No
CONOCOPHILLIPS COMPANY	217817	Release Other	8/11/21	Crude Oil	2	2	0	BBL	Power Failure	Valve	No
LEGACY RESERVES OPERATING, LP	240974	Oil Release	8/9/21	Crude Oil	0	0	0	BBL	Other	Tank ( Any)	No
API 30-025-26225	331199	Other	7/23/21	Crude Oil	1	0	1	BBL	Equipment Failure	Other (Specify)	No
CONOCOPHILLIPS COMPANY	217817	Other	5/28/21	Crude Oil	0	0	0	BBL	Other	Flow Line - Production	No
CONOCOPHILLIPS COMPANY	217817	Produced Water Release	2/4/21	Crude Oil	4	2	2	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-02979	331199	Produced Water Release	12/21/20	Crude Oil	1	0	1	BBL	Equipment Failure	Other (Specify)	No
CONOCOPHILLIPS COMPANY	217817	Release Other	9/19/20	Crude Oil	0	0	0	BBL	Corrosion	Pipeline (Any)	No
API 30-025-02086	331199	Release Other	7/22/20	Crude Oil	3	0	3	BBI	Corrosion	Flow Line - Production	No
CONOCOPHILLIPS COMPANY	217817	Release Other	6/29/20	Crude Oil	4	0	4	BBI	Corrosion	Flow Line - Production	No
	217817	Release Other	6/16/20	Crude Oil	14	5	9	BBI	Corrosion	Flow Line - Production	No
API 30-025-26519	331100	Release Other	5/10/20	Crude Oil	1	0	1	BBL	Equipment Failure	Other (Specify)	No
API 30-025-32219	331100	Release Other	3/16/20	Crude Oil	1	1	0	BBI	Corrosion	Elow Line - Production	No
	217817	Produced Water Release	1/10/20		10	2	8	BBI	Blow Out	Pipeline (Any)	No
API 30.025.03008	331100	Produced Water Release	1/2/20	Crude Oil	10	0	0	BBI	Corrosion	Pipeline (Any)	No
	017917	Poloase Other	12/20/10	Crude Oil	1	0	1		Corrosion Equipment Eailure	Fipeline (Any)	No
	217017	Release Other	10/20/19	Crude Oil	1	0	1			Flow Line - Production	No
	217017	Release Other	10/29/19	Crude Oil	11	0	5			Flow Line - Production	No
	21/01/	Release Other	10/10/19		501	0	C C			Flow Line - Injection	INO No
	21/01/	Other	9/24/19		001	200	290		Other		INO No
	21/81/	Other	8/15/19	Crude Oil	2	0	2	BBL		Pipeline (Any)	NO
	217817		10/24/18	Crude Oil	5	4	1	BBL		Flow Line - Production	NO
PHILLIPS 66 NM 28 EAST GLORIETTA PIPELINE	34019		9/28/18		220	0	220	BBL	Other	Pipeline (Any)	NO
API 30-025-32219	331199		5/30/18	Crude Oil	2	2	0	BBL	Equipment Failure	Flow Line - Production	NO
API 30-025-26225	331199		5/29/18	Crude Oil	18	17	1	BBL	Equipment Failure	Well	NO
API 30-025-02968	331199	Oil Release	5/14/18	Crude Oil	11	10	1	BBL	Other	Pipeline (Any)	No
API 30-025-26658	331199	Oil Release	1/27/18	Crude Oil	5	1	4	BBL	Equipment Failure	Other (Specify)	NO
API 30-025-21382	331199	Oil Release	1/15/18	Crude Oil	5	0	5	BBL	Overflow - Tank, Pit,	, Frac Tank	No
		Oil Release	1/1/18	Crude Oil	16	15	1	BBL	Equipment Failure	Pipeline (Any)	No
API 30-025-02879	217817	Oil Release	9/14/17	Crude Oil	6	0	6	BBL	Equipment Failure	Valve	No
API 30-025-26654	331199	Oil Release	8/1/17	Crude Oil	4	0	4	BBL	Normal Operations	Other (Specify)	No
API 30-025-26577	331199	Oil Release	1/17/17	Crude Oil	22	15	7	BBL	Other	Flow Line - Production	No
API 30-025-02824	217817	Produced Water Release	9/29/16	Crude Oil	10	10	0	BBL	Equipment Failure	Flow Line - Injection	No
VGEU East Battery	217817	Oil Release	9/8/16	Crude Oil	3	2	1	BBL	Equipment Failure	Valve	No
API 30-025-02987	331199	Produced Water Release	4/4/16	Crude Oil	10	5	5	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26388	331199	Produced Water Release	3/13/16	Crude Oil	7	7	0	BBL	Equipment Failure	Well	No
API 30-025-26225	331199	Oil Release	2/3/16	Crude Oil	15	15	0	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-34702	231429	Produced Water Release	1/7/16	Crude Oil	17	6	11	BBL	Equipment Failure	Valve	No
API 30-025-26652	331199	Produced Water Release	11/2/15	Crude Oil	54	53	1	BBL	Lightning	Flow Line - Production	No
API 30-025-02979	331199	Oil Release	10/16/15	Crude Oil	10	4	6	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26395	331199	Oil Release	8/3/15	Crude Oil	1	1	0	BBL	Equipment Failure	Pump	No
API 30-025-26679	331199	Oil Release	6/15/15	Crude Oil	30	20	10	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-32844	4323	Oil Release	5/13/15	Crude Oil	4	0	0	BBL	Equipment Failure	Valve	No
API 30-025-03008	331199	Produced Water Release	3/3/15	Crude Oil	2	0	2	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26521	331199	Oil Release	3/3/15	Crude Oil	34	28	6	BBL	Equipment Failure	Tank ( Any)	No
API 30-025-35769	246289	Oil Release	8/29/14	Crude Oil	170	5	165	BBL	Corrosion	Production Tank	No
API 30-025-24237	256073	Produced Water Release	8/8/14	Crude Oil	86	50	36	BBL	Corrosion	Tank ( Any)	No
API 30-025-32062	331199	Oil Release	6/27/14	Crude Oil	7	0	7	BBL	Equipment Failure	Well	No
API 30-025-38346	331199	Release Other	6/16/14	Crude Oil	92	50	42	BBL	Corrosion	Flow Line - Production	No

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS
site name	type	ID	agency	lat, WGS84	long, WGS84	twnshp	range	section	incident number	
API 30-025-24237	OCD spill		OCD			17S	35E	20	nTO1414725188	BUCKEYE STATE CO
API 30-025-05430	OCD spill		OCD			17S	36E	1	nAPP2204136156	C S CAYLOR SR EST
MARK L SHIDLER INC	OCD spill		OCD			17S	36E	30	nAPP2113128972	
Grizzly Operating, LLC	OCD spill		OCD			17S	36E	1	nCE2002946094	
API 30-025-37902	OCD spill		OCD			17S	36E	11	nCH1903555607	ANGELL #001
API 30-025-39076	OCD spill		OCD			17S	36E	11	nCH1903352778	ANGELL B #002
API 30-025-37902	OCD spill		OCD			17S	36E	11	nOY1819735702	ANGELL #001
API 30-025-39076			OCD			1/5	36E	11	nOY1821433850	ANGELL B #002
API 30-025-39076						175	36E	11	nOY1810829550	ANGELL B #002
API 30-025-37902						175	36E	11	nOY1729656856	ANGELL #001
API 30-025-03941						175	36E	20	nKL1623633095	NEW MEXICO X STA
API 30-025-41960						175	30E	9	n101500542439	XIU 9 STATE #001
API 30-025-41074						175	375	20	nCH1010929621	VEST LOVINGTON 2
API 30-025-05396		-				175	375	5	nOY1717055453	LOVINGTON #001
EVCSALL Satellite 3 trunk line		-				175	375	21	nOY1715055207	LOVINGTON #001
						173	37	2	nOV1707247022	I EA VI STATE #002
API 30-025-31005						175	37E	 18	nOV1706027706	NM DE STATE #002
API 30-025-21618						175	37E	18	nOV17060287/1	NM DE STATE #001
API 30-025-20440						175	37E	0 0	nK 115302/7171	NEW MEXICO EX ST
NAVA IO REFINING COMPANY 1.1.C						165	37E	31	nCS2002730188	
Lovington Booster Station						165	37E	31	n IXK1619047751	
VINDICATOR CANYON STATE LINIT BATTERY						175	36E	15	nΔPP2209427472	
Field #1						165	35E	3	nK.11603451563	
Navajo Lovington Refinery						165	37E	31	nCS2002756416	
ConocoPhillips EVGSAU CTB			OCD			175	35E	33	nRM1930848978	
Central Vacuum Unit Battery			OCD			175	35F	31	nJXK1610431258	
API 30-025-33894			OCD			16S	36E	12	nAPP2218940551	SV KIM HARRIS #003
API 30-025-36866	OCD spill		OCD			16S	36E	20	nAPP2118726438	RUTH 20 #002
API 30-025-31364	OCD spill		OCD			16S	36E	36	nAPP2104650946	LOVINGTON SAN AN
Lovington Refinery	OCD spill		OCD			16S	36E	36	nOY1822234517	
API 30-025-34197	OCD spill		OCD			16S	36E	6	nOY1713545743	WATSON 6 #001
API 30-025-33876	OCD spill		OCD			16S	36E	8	nOY1701844321	CHAMBERS STRAW
API 30-025-02690	OCD spill		OCD			15S	35E	7	nAPP2213950465	CABOT Q STATE SW
API 30-025-02690	OCD spill		OCD			15S	35E	7	nJXK1615353185	CABOT Q STATE SW
API 30-025-37925	OCD spill		OCD			15S	36E	21	nRM2006430999	CAUDILL SOUTH 21
API 30-025-03682	OCD spill		OCD			15S	36E	16	nKJ1605632834	STATE GA #001
MAYFLY 14 STATE #5 TANK BATTERY	OCD spill		OCD			16S	35E	14	nDHR1913445231	
API 30-025-34535	OCD spill		OCD			16S	35E	9	nTO1423838365	HARROD #001
API 30-025-31634	OCD spill		OCD			16S	37E	31	nAPP2104630028	LOVINGTON PADDO
API 30-025-21739	OCD spill		OCD			16S	37E	30	nRM2034453708	STATE Q #002
API 30-025-21792	OCD spill		OCD			16S	37E	30	nRM2034455815	STATE Q #003
API 30-025-21807	OCD spill		OCD			16S	37E	30	nRM2034533903	STATE Q #004
DCP A-9-6 line	OCD spill		OCD			16S	37E	8	nOY1728435865	
API 30-025-30406	OCD spill		OCD			16S	37E	8	nKL1623928950	CAUDILL #002
EVLRP	OCD spill		OCD			17S	35E	26	nAPP2213957732	
EVGSAU SATELLITE 1	OCD spill		OCD			17S	35E	19	nAPP2210950771	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	nAPP2207331663	
COG OPERATING LLC	OCD spill		OCD			17S	35E	22	nAPP2201143320	
COG OPERATING LLC			OCD			1/5	35E	31	nAPP2200643457	
						175	35E	28	nAPP2130843704	
						1/5	35E	34	nAPP2129936218	
						1/5	35E	32	nAPP2125634309	
						170	აე⊑ 25⊑	33	nAPP21223/1330	
						170	30E	20	nAFF2123242125	EAST VACUUNI (GSA
						170	350	20	nAFF2110024200	
		+				170	30E	32 32	nAFF2100004120	EAST VACUUM (CS/
						179	355	32	nAFF2100449113 nRM2027062353	
API 30-025-02086						179	35	10	nRM2027302333	FAST VACUUM (CS/
/11 1 00-020-02000			000	1	1	110	55E	13	1111112021520341	

well name	facility type
E COM #001	
ESTATE #003	
STATE #001	
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ON 20 #001	
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002	1
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001	
STATE #002	1
#003	
ANDRES UNIT #070	
AWN UNIT #002	
SWD #001	
SWD #001	
21 FEE #002H	
DOCK UNIT #134	
35A) UNIT #002	
JUNIT #UUZ	
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53A) UNIT #004	l
JONI #001	

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANT  ${\boldsymbol{\mathsf{S}}}$ 

			incident	material	volume	volume	volume	volume			gw
site name	operator	incident type	date	spilled	spilled	recovered	lost	units	spill cause	spill source	impact
API 30-025-24237	256073	Oil Release	5/5/14	Crude Oil	86	50	36	BBL	Corrosion	Production Tank	No
API 30-025-05430	330447	Produced Water Release	2/8/22	Crude Oil	2	1	1	BBL	Other	Flow Line - Injection	No
MARK L SHIDLER INC	14096	Oil Release	4/27/21	Crude Oil	0	0	0	BBL	Overflow - Tank, Pit,	Other (Specify)	No
Grizzly Operating, LLC	258350	Produced Water Release	11/25/19	Crude Oil	100	100	0	BBL	Equipment Failure	Valve	No
API 30-025-37902	372098	Oil Release	12/30/18	Crude Oil	9	8	1	BBL	Human Error	Tank ( Any)	No
API 30-025-39076	372098	Oil Release	12/6/18	Crude Oil	13	3	10	BBL	Equipment Failure	Gasket	NO
API 30-025-37902	372098		7/10/18	Crude Oil	11	12	2	GAL	Equipment Failure	VVell Treating Towar	NO
API 30-025-39070	372008		1/12/10	Crude Oil	10	12	11			Topk ( Apy)	No
API 30-025-39070	372008		4/9/10	Crude Oil	11	11	0	BBI	Corrosion Equipment Eailure	Tank ( Any)	No
API 30-025-030/1	12627		8/11/16		0	0	0	BBI	Equipment Failure	Separator	No
API 30-025-41960	113315	Produced Water Release	12/31/14	Crude Oil	20	20	0	BBI	Freeze	Valve	No
API 30-025-41074	371755	Oil Release	6/8/18	Crude Oil	80	50	30	BBI	Overflow - Tank, Pit.	Tank (Anv)	No
API 30-025-05398	232611	Oil Release	6/19/17	Crude Oil	15	0	0	BBL		·	No
API 30-025-05398	232611	Oil Release	6/19/17	Crude Oil	15	5	10	BBL	Human Error	Valve	No
EVGSAU Satellite 3 trunk line	217817	Oil Release	6/2/17	Crude Oil	130	55	75	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-31005	113315	Oil Release	3/13/17	Crude Oil	0	0	0	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-21618	12627	Oil Release	1/30/17	Crude Oil	0	0	0	BBL	Freeze	Other (Specify)	No
API 30-025-21618	12627	Oil Release	1/30/17	Crude Oil	0	0	0	BBL	Other	Unknown	No
API 30-025-29440	5691	Produced Water Release	10/29/15	Crude Oil	0	0	0	BBL	Equipment Failure	Fitting	No
NAVAJO REFINING COMPANY, L.L.C.	15694	Release Other	11/22/19	Diesel	0	0	0	BBL	Other	Tank ( Any)	No
Lovington Booster Station	36785	Fire	7/7/16	Diesel	0	0	0	BBL			No
VINDICATOR CANYON STATE UNIT BATTERY	231429	Vent with Flaring	4/3/22	Motor Oil	0	0	0	Mcf	Midstream Emergen	Other (Specify)	No
Field #1	24650	Natural Gas Release	2/3/16	Natural Gas Liqui	0	0	0	BBL	Equipment Failure	Pipeline (Any)	No
Navajo Lovington Refinery	15694	Other	11/8/19	Other (Specify)	0	0	0	BBL	Corrosion	Tank ( Any)	Yes
ConocoPhillips EVGSAU CTB	217817	Other	9/24/19	Other (Specify)	64	62	2	BBL	Other	Tank ( Any)	No
Central Vacuum Unit Battery	330132	Natural Gas Release	4/12/16	Other (Specify)	70	0	70	Mcf	Equipment Failure	Tank ( Any)	No
API 30-025-33894	1092	Produced Water Release	7/8/22	Produced Water	40	0	40	BBL	Lightning	Production Tank	No
API 30-025-36866	1092	Other	7/5/21	Produced Water	170	40	130	BBL	Fire	Water Tank	No
API 30-025-31364	4323	Produced Water Release	10/29/20	Produced Water	15	0	15	BBL	Equipment Failure	Flow Line - Injection	No
Lovington Refinery	15694	Oil Release	7/9/18	Produced Water	7	3	4	BBL	Equipment Failure	Pipeline (Any)	No
API 30-025-34197	210091	Produced Water Release	5/15/17	Produced Water	50	50	0	BBL	Equipment Failure	Tank ( Any)	No
API 30-025-33876	241333	Produced Water Release	12/19/16	Produced Water	45	38	7	BBL	Freeze	Pipeline (Any)	No
API 30-025-02690	151416	Produced Water Release	5/28/16	Produced Water	110	100	10	BBL	Other	Flow Line - Injection	NO
API 30-025-02690		Produced Water Release	5/28/16	Produced Water	110	100	10	BBL		Flow Line - Injection	NO
API 30-025-37925	330539	Produced Water Release	2/16/20	Produced Water	30	30	0	BBL	Corrosion	Tank (Any)	NO
API 30-023-03002 MAVELV 14 STATE #5 TANK BATTERV	330423	Produced Water Release	2/23/10	Produced Water	90	0	90		Lightning	Topk (Apv)	NO
API 30-025-34535	328//0	Produced Water Release	8/26/14	Produced Water	130	0	130	BBI	Equipment Eailure	Gasket	No
API 30-025-31634	4323	Produced Water Release	10/29/20	Produced Water	7	0	7	BBI	Equipment Failure	Well	No
API 30-025-21739	181109	Release Other	10/16/20	Produced Water	0	0	0	BBI	Other	Other (Specify)	No
API 30-025-21792	181109	Release Other	10/16/20	Produced Water	0	0	0	BBI	Other	Well	No
API 30-025-21807	181109	Release Other	10/16/20	Produced Water	0	0	0	BBL	Other	Other (Specify)	No
DCP A-9-6 line	705987	Produced Water Release	10/11/17	Produced Water	10	7	3	BBL	Human Error	Pipeline (Any)	No
API 30-025-30406	14245	Produced Water Release	8/24/16	Produced Water	56	35	21	BBL	Equipment Failure	Coupling	No
EVLRP	217817	Release Other	5/5/22	Produced Water	17	0	17	BBL	Corrosion	Pump	No
EVGSAU SATELLITE 1	217817	Release Other	4/6/22	Produced Water	7	0	7	BBL	Equipment Failure	Well	No
CONOCOPHILLIPS COMPANY	217817	Release Other	2/27/22	Produced Water	4	2	2	BBL	Equipment Failure	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	1/6/22	Produced Water	5	0	5	BBL	Equipment Failure	Unknown	No
COG OPERATING LLC	229137	Produced Water Release	12/21/21	Produced Water	66	0	66	BBL	Corrosion	Flow Line - Injection	No
CONOCOPHILLIPS COMPANY	217817	Release Other	10/25/21	Produced Water	211	200	11	BBL	Human Error	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	10/12/21	Produced Water	128	0	128	BBL	Corrosion	Flow Line - Production	No
COG OPERATING LLC	229137	Release Other	8/12/21	Produced Water	5	0	5	BBL	Corrosion	Other (Specify)	No
CONOCOPHILLIPS COMPANY	217817	Release Other	8/11/21	Produced Water	269	261	8	BBL	Power Failure	Valve	No
API 30-025-26225	331199	Other	7/23/21	Produced Water	7	4	3	BBL	Equipment Failure	Other (Specify)	No
	21/81/		5/28/21	Produced Water	25	15	10	BBL		Flow Line - Production	No
ADI 20.025.02070	21/01/	Produced Water Release	2/4/21	Produced Water	26	18	8	BRF	Equipment Failure	Cthor (Specific)	NO No
	017917	Poloaco Othor	0/10/20	Produced Water	Ŏ o	0	Ö o	DDI DDI		Diner (Speciry)	NO No
	331100	Release Other	3/13/20	Produced Water	0	0	0		Equipment Feilure	Fipeline (Any)	No
	551100	IVEIEASE OUIEI	1122120	Frounded water	10	U	10	DDL		I IOW LINE - Production	INU

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

				1.4		dhä	е	ion			
sito namo	type	חו	agonev	lat, WGS84	long,	suv	ang	ect	incident number	well name	facility type
API 30-025-26593	OCD spill	שו		WG304	WG364	17S	35E	<b>ഗ</b> 12	nAPP2109954143	LINO MAS #001	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	nRM2019933917		
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	nRM2017856312		
API 30-025-26519	OCD spill		OCD			17S	35E	33	nRM2014564602	EAST VACUUM (GSA) UNIT #005	
API 30-025-02937	OCD spill		OCD			17S	35E	29	nRM2014565278	EAST VACUUM (GSA) UNIT #002	
API 30-025-32219	OCD spill		OCD			17S	35E	33	nRM2008348428	EAST VACUUM (GSA) UNIT #007	
CONOCOPHILLIPS COMPANY	OCD spill		OCD			17S	35E	32	nCE2003542701		
API 30-025-03008	OCD spill		OCD			17S	35E	34	nRH2003532478	EAST VACUUM (GSA) UNIT #002H	
	OCD spill		OCD			17S	35E	35	nRM2003534693		
			OCD			175	35E	32	nRM2001345972		
						175	35E	19	nRM1935733118		
EVGSAU Well 2004-002						175	30E	20	nRM1930956355		
	OCD spill					175	35E	30	n\/\/2003554062		
	OCD spill					175	35E	32	nRM1925659370		
API 30-025-02952						175	35E	31	nCH1903942116	CENTRAL VACUUM UNIT #003	
Central Vacuum Unit Battery	OCD spill		OCD			17S	35E	31	nAB1909454481		
API 30-025-20846	OCD spill		OCD			17S	35E	32	nCH1903240708	VACUUM GLORIETA EAST UNIT #001	
EVGSAU SATELLITE 3	OCD spill		OCD			17S	35E	32	nOY1830935907		
API 30-025-32219	OCD spill		OCD			17S	35E	33	nOY1815239274	EAST VACUUM (GSA) UNIT #007	
API 30-025-26225	OCD spill		OCD			17S	35E	28	nOY1815237113	EAST VACUUM (GSA) UNIT #002	
API 30-025-02968	OCD spill		OCD			17S	35E	32	nOY1814150716	EAST VACUUM (GSA) UNIT #012	
API 30-025-21382	OCD spill		OCD			17S	35E	34	nOY1801748389	EAST VACUUM (GSA) UNIT #010	
API 30-025-26955	OCD spill		OCD			17S	35E	7	nOY1800853345	STATE ZZ COM #001	
ConocoPhillips EVGSAU CTB	OCD spill		OCD			17S	35E	33	nOY1800329215		
API 30-025-26577	OCD spill		OCD			17S	35E	29	nOY1704044285	EAST VACUUM (GSA) UNIT #001	
API 30-025-02824	OCD spill					17S	35E	19	nKL1627945337	EAST VACUUM (GSA) UNIT #001	
VGEU East Battery						175	35E	27	nKL1625827670		
API 30-025-08526						175	35E	27	nJXK1616547061		
API 30-025-20377						175	30E	29	nJAK 1013337000		
API 30-025-02907						175	35E	33	nJXK1609752005	EAST VACUUM (GSA) UNIT #029	
API 30-025-20300 API 30-025-34025						175	35E	33	nJXK1606850915	EAST VACUUM (GSA) UNIT #003	
API 30-025-26225						175	35E	28	nK.11603452629	EAST VACUUM (GSA) UNIT #002	
API 30-025-34702	OCD spill					175	35F	15	nKJ1600726055	SOUTH SHOEBAR 15 STATE #002	
API 30-025-26652	OCD spill		OCD			17S	35E	32	nJXK1530637430	EAST VACUUM (GSA) UNIT #011	
API 30-025-02979	OCD spill		OCD			17S	35E	32	nJXK1528944722	EAST VACUUM (GSA) UNIT #004	
API 30-025-26395	OCD spill		OCD			17S	35E	26	nJXK1521626690	EAST VACUUM (GSA) UNIT #004	
API 30-025-27315	OCD spill		OCD			17S	35E	21	nKJ1516743465	EAST VACUUM (GSA) UNIT #001	
API 30-025-32844	OCD spill		OCD			17S	35E	31	nKJ1513333641	STATE A #010	
API 30-025-21012	OCD spill		OCD			17S	35E	32	nTO1510334242	VACUUM GLORIETA EAST UNIT #001	
API 30-025-03008	OCD spill		OCD			17S	35E	34	nTO1506255588	EAST VACUUM (GSA) UNIT #002H	
API 30-025-26521	OCD spill		OCD			17S	35E	34	nTO1506430213	EAST VACUUM (GSA) UNIT #005	
API 30-025-32333	OCD spill		OCD			17S	35E	31	nTO1500935732	SANTA FE #133	
API 30-025-32063						175	35E	33	n101434346107	EAST VACUUM (GSA) UNIT #001	
API 30-025-02881						175	35E	26	n101434250908	EAST VACUUM (GSA) UNIT #034	
API 30-025-40400						175	35E	31	n101430726307		
API 30-025-20575						175	30E	20	nTO1430053203		
ΔPI 30-025-37830	OCD spill					175	35E	31	nTO1420030140	SANTA EE #133	
ΔPI 30-025-32333	OCD spill					175	35E	22	nTO1423829108	HOOSIER 22 STATE #002	
API 30-025-34835	OCD spill					175	35F	31	nTO1422557350	EAST VACUUM (GSA) UNIT #398	
API 30-025-26779	OCD spill					175	35F	27	nTO1418857162	EAST VACUUM (GSA) UNIT #007	
API 30-025-40876	OCD spill		OCD			17S	35E	22	nSAD1411345933	HOOSIER 22 STATE #002	
API 30-025-05430	OCD spill		OCD			17S	36E	1	nAPP2204136156	C S CAYLOR SR ESTATE #003	
MARK L SHIDLER INC	OCD spill		OCD			17S	36E	30	nAPP2117534750		
MARK L SHIDLER INC	OCD spill		OCD			17S	36E	30	nAPP2113128972		
API 30-025-28399	OCD spill		OCD			17S	36E	30	nAPP2108857845	ABO D 7903 JV-P #001	
Grizzly Operating, LLC	OCD spill		OCD			17S	36E	1	nRM2032857772		
Grizzly Operating, LLC	OCD spill		OCD			17S	36E	1	nRM2022558133		

			incident	material	volumo	volumo	volumo	volumo			<b>CIW</b>
site name	operator	incident type	date	spilled	spilled	recovered	lost	units	spill cause	spill source	impact
API 30-025-26593	24010	Produced Water Release	7/9/20	Produced Water	130	0	130	BBL	Vandalism	Truck	No
CONOCOPHILLIPS COMPANY	217817	Release Other	6/29/20	Produced Water	16	1	15	BBL	Corrosion	Flow Line - Production	No
CONOCOPHILLIPS COMPANY	217817	Release Other	6/16/20	Produced Water	56	0	56	BBL	Corrosion	Flow Line - Production	No
API 30-025-26519	331199	Release Other	5/10/20	Produced Water	30	0	30	BBL	Equipment Failure	Other (Specify)	No
API 30-025-02937	331199	Produced Water Release	5/9/20	Produced Water	54	0	54	BBL	Corrosion	Other (Specify)	No
API 30-025-32219	331199	Release Other	3/16/20	Produced Water	135	129	6	BBL	Equipment Failure	Flow Line - Production	No
CONOCOPHILLIPS COMPANY	217817	Produced Water Release	1/10/20	Produced Water	56	2	54	BBL	Blow Out	Pipeline (Any)	No
API 30-025-03008	331199	Produced Water Release	1/2/20	Produced Water	54	0	54	BBL	Corrosion	Pipeline (Any)	No
CONOCOPHILLIPS COMPANY	217817	Release Other	12/30/19	Produced Water	28	1	27	BBL	Equipment Failure	Flow Line - Production	No
CONOCOPHILLIPS COMPANY	217817	Produced Water Release	11/11/19	Produced Water	100	0	100	BBL	Other	Injection Header	No
CONOCOPHILLIPS COMPANY	217817	Release Other	10/29/19	Produced Water	22	10	12	BBL	Other	Flow Line - Production	No
EVGSAU Well 2864-002	217817	Release Other	10/10/19	Produced Water	362	174	188	BBL	Blow Out	Flow Line - Injection	No
Chevron Central Vacuum Unit Injection Station	4323	Produced Water Release	8/30/19	Produced Water	106	80	26	BBL	Corrosion	Flow Line - Injection	No
CHEVRON U S A INC	4323	Produced Water Release	8/30/19	Produced Water	106	80	26	BBL	Corrosion	Flow Line - Injection	No
CONOCOPHILLIPS COMPANY	217817	Other	8/15/19	Produced Water	46	0	46	BBL	Corrosion	Pipeline (Any)	No
API 30-025-02952	330132	Produced Water Release	1/23/19	Produced Water	11	11	0	BBL	Equipment Failure	Pump	No
Central Vacuum Unit Battery	330132	Produced Water Release	1/23/19	Produced Water	11	11	0	BBL	Equipment Failure	Pump	No
API 30-025-20846	331199	Produced Water Release	12/10/18	Produced Water	45	25	20	BBL	Equipment Failure	Flow Line - Production	No
EVGSAU SATELLITE 3	217817	Oil Release	10/24/18	Produced Water	117	16	101	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-32219	331199	Oil Release	5/30/18	Produced Water	28	10	18	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26225	331199	Oil Release	5/29/18	Produced Water	40	3	37	BBL	Equipment Failure	Well	No
API 30-025-02968	331199	Oil Release	5/14/18	Produced Water	10	0	10	BBL	Other	Pipeline (Any)	No
API 30-025-21382	331199	Oil Release	1/15/18	Produced Water	5	0	5	BBL	Overflow - Tank, Pit,	Frac Tank	No
API 30-025-26955	21355	Produced Water Release	1/3/18	Produced Water	10	0	10	BBL	Equipment Failure	Flow Line - Production	No
ConocoPhillips EVGSAU CTB	217817	Oil Release	1/1/18	Produced Water	21	20	1	BBL	Equipment Failure	Pipeline (Anv)	No
API 30-025-26577	331199	Oil Release	1/17/17	Produced Water	22	15	7	BBL	Other	Flow Line - Production	No
API 30-025-02824	217817	Produced Water Release	9/29/16	Produced Water	5	5	0	BBL	Equipment Failure	Flow Line - Injection	No
VGEU East Battery	217817	Oil Release	9/8/16	Produced Water	88	68	20	BBL	Equipment Failure	Valve	No
API 30-025-08526	217817	Produced Water Release	6/11/16	Produced Water	38	25	13	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26577	331199	Produced Water Release	5/11/16	Produced Water	5	0	5	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-02987	331199	Produced Water Release	4/4/16	Produced Water	6	5	1	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26388	331199	Produced Water Release	3/13/16	Produced Water	17	8	9	BBL	Equipment Failure	Well	No
API 30-025-34025	331199	Produced Water Release	2/26/16	Produced Water	141	95	46	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-26225	331199	Oil Release	2/3/16	Produced Water	0	0	0	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-34702	231429	Produced Water Release	1/7/16	Produced Water	27	0	27	BBL	Equipment Failure	Valve	No
API 30-025-26652	331199	Produced Water Release	11/2/15	Produced Water	423	422	1	BBL	Lightning	Flow Line - Production	No
API 30-025-02979	331199	Oil Release	10/16/15	Produced Water	8	4	4	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26395	331199	Oil Release	8/3/15	Produced Water	31	39	-8	BBL	Equipment Failure	Pump	No
API 30-025-27315	331199	Produced Water Release	6/15/15	Produced Water	30	7	23	BBL	Equipment Failure	Fitting	No
API 30-025-32844	4323	Oil Release	5/13/15	Produced Water	6	0	0	BBL	Equipment Failure	Valve	No
API 30-025-21012	331199	Produced Water Release	4/13/15	Produced Water	70	40	30	BBL	Lightning	Valve	No
API 30-025-03008	331199	Produced Water Release	3/3/15	Produced Water	7	0	7	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26521	331199	Oil Release	3/3/15	Produced Water	2240	1837	403	BBL	Equipment Failure	Tank ( Any)	No
API 30-025-32333	331199	Produced Water Release	1/9/15	Produced Water	20	15	5	BBL	Overflow - Tank, Pit,	, Tank ( Any)	No
API 30-025-32063	331199	Produced Water Release	12/9/14	Produced Water	82	50	32	BBL	Equipment Failure	Well	No
API 30-025-02881	331199	Produced Water Release	12/8/14	Produced Water	92	50	42	BBL	Equipment Failure	Well	No
API 30-025-40466	330132	Produced Water Release	10/31/14	Produced Water	84	70	14	BBL		Separator	No
API 30-025-26573	217817	Produced Water Release	10/27/14	Produced Water	7	0	7	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-37850	331199	Produced Water Release	9/17/14	Produced Water	12	5	7	BBL	Corrosion	Flow Line - Production	No
API 30-025-32333	331199	Produced Water Release	9/15/14	Produced Water	20	10	10	BBL	Human Error	Separator	No
API 30-025-40876	24010	Produced Water Release	8/26/14	Produced Water	35	30	5	BBL	Equipment Failure	Valve	No
API 30-025-34835	331199	Produced Water Release	8/13/14	Produced Water	8	0	8	BBL	Equipment Failure	Flow Line - Production	No
API 30-025-26779	331199	Produced Water Release	5/15/14	Produced Water	6	5	1	BBL	Equipment Failure	Well	No
API 30-025-40876	24010	Produced Water Release	4/6/14	Produced Water	35	30	5	BBL	Equipment Failure	Tank ( Any)	No
API 30-025-05430	330447	Produced Water Release	2/8/22	Produced Water	35	29	6	BBL	Other	Flow Line - Injection	No
MARK L SHIDLER INC	14096	Produced Water Release	5/27/21	Produced Water	0	0	0	BBL	Equipment Failure	Other (Specify)	No
MARK L SHIDLER INC	14096	Oil Release	4/27/21	Produced Water	0	0	0	BBL	Overflow - Tank, Pit,	Other (Specify)	No
API 30-025-28399	260297	Release Other	2/10/21	Produced Water	90	0	90	BBL	Other	Unknown	No
Grizzly Operating, LLC	258350	Produced Water Release	11/9/20	Produced Water	12	12	0	BBL	Vehicular Accident	Flow Line - Production	No
Grizzly Operating, LLC	258350	Produced Water Release	8/10/20	Produced Water	23	0	23	BBL	Equipment Failure	Flow Line - Production	No

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

				lat	long	dha	ge	ion			
site name	type	ח	agency	lat, WGS84	uong, WGS84	ŝŭ	anç	sect	incident number	well name	facility type
CHEVRON MIDCONTINENT, L.P.		15	OCD			17S	36E	12	nRM2019524383		
Grizzly Operating, LLC	OCD spill		OCD			17S	36E	1	nCE2002946094		
API 30-025-03816	OCD spill		OCD			17S	36E	1	nCH1828533458	STATE SEC 1 LA #008	
API 30-025-31521	OCD spill		OCD			17S	36E	8	nCH1825351115	WEST LOVINGTON UNIT #099	
API 30-025-03849	OCD spill		OCD			17S	36E	2	nOY1726455140	ABO SWD ROC #002	
API 30-025-03833	OCD spill		OCD			17S	36E	1	nOY1701837929	LOVINGTON PADDOCK UNIT #071	
API 30-025-41960	OCD spill		OCD			17S	36E	9	nTO1500542439	XTO 9 STATE #001	
API 30-025-30964	OCD spill		OCD			17S	36E	4	nTO1424541014	WEST LOVINGTON UNIT #072	
API 30-025-05430	OCD spill		OCD			17S	37E	6	nCH1826343790	C S CAYLOR SR ESTATE #003	
ABO PUMP STATION B-6	OCD spill		OCD			17S	37E	6	nOY1814332779		
API 30-025-05430	OCD spill		OCD			17S	37E	6	nOY1730055065	C S CAYLOR SR ESTATE #003	
Cobalt Warren Battery	OCD spill		OCD			17S	37E	8	nOY1727658004		
API 30-025-31005	OCD spill		OCD			17S	37E	2	nOY1707247923	LEA YL STATE #002	
STATE V TANK BATTERY	OCD spill		OCD			17S	37E	5	nOY1707237630		
API 30-025-29440	OCD spill		OCD			17S	37E	9	nKJ1530247171	NEW MEXICO EX STATE #002	
API 30-025-26323	OCD spill		OCD			17S	37E	8	nTO1434631735	WARREN #001	
API 30-025-31148	OCD spill		OCD			16S	37E	31	nJXK1534930223	LOVINGTON PADDOCK UNIT #089	
API 30-025-05381				00.04.04.70	100 10 10	165	37E	31	nJXK1534931388	LOVINGTON SAN ANDRES UNIT #058	
Pure-Lovington San Andres Unit				32 31 34.72	103 10 16	16 S	37 E	31	nPRS0523551709		Pipeline - Water
Lovington San Andres Unit				32 31 34.72	103 10 16	16 5	37 E	32	nPRS0522857671		Pipeline - Water
				32 30 51.26	103 11 43.44	175	36 E	2	nPRS0520956210		Metering/Gathering Satellite
API 30-025-29503				32 56 17.39	103 15 56.09	16.5	37 E	8	nSAP0219632751		
API 30-025-29503				32 56 17.39	103 15 56.09	10 5	37 E	8	nSAP0219632751		
API 30-025-31033				32 51 30.6	103 16 17.99	175	37 E	5	nGRL1035155336		
API 30-025-31033				32 51 30.0	103 16 17.99	17 8	37 E	5	nGRL1006237400		
API 30-025-31033				32 51 30.0	103 10 17.99	16 9	37 E	22	nLVVJ1005720990		+
API 30-025-05300 API 30-025-05301				32 52 30.37	103 16 47.99	16 5	37 E	32	nPAC0535554436	STATE D #005	+
API 30-025-315/8	OCD spill			32 52 20.04	103 10 40.04	16 5	37 E	31	nGRI 0016650301	I OVINGTON SAN ANDRES LINIT #082	
API 30-025-05360	OCD spill			32 52 20.2	103 17 11.13	16.5	37 E	31	nBAC0708525321	I OVINGTON SAN ANDRES UNIT #016	+
API 30-025-30752	OCD spill			32 52 29 43	103 17 27 97	16.5	37 E	31	nPAC0534846426	I OVINGTON SAN ANDRES UNIT #060	+
API 30-025-30752	OCD spill			32 52 29 43	103 17 27 97	16.5	37 E	31	nPAC0534846426	I OVINGTON SAN ANDRES UNIT #060	+
API 30-025-05355	OCD spill			32 52 36.32	103 17 34.61	16 S	37 F	31	nPAC0530649613	I OVINGTON PADDOCK UNIT #027	
API 30-025-05424	OCD spill		OCD	32 52 10.2	103 17 35.58	17 S	37 E	6	nSAP0220742237	C S CAYLOR #003	
API 30-025-05424	OCD spill		OCD	32 52 10.2	103 17 35.58	17 S	37 E	6	nSAP0220742114	C S CAYLOR #003	
API 30-025-05357	OCD spill		OCD	32 52 23.25	103 17 46.47	16 S	37 E	31	nPRS0420744957	LOVINGTON SAN ANDRES UNIT #023	
API 30-025-05357	OCD spill		OCD	32 52 23.25	103 17 46.47	16 S	37 E	31	nPRS0420744957	LOVINGTON SAN ANDRES UNIT #023	
API 30-025-21792	OCD spill		OCD	32 53 37.73	103 17 53.52	16 S	37 E	30	nPAC0717753943	STATE Q #003	
Plains Frisco Skelly #1	OCD spill		OCD	32 52 02.4	103 18 00.73	16 S	36 E	36	nEEM0528952598		
API 30-025-31367	OCD spill		OCD	32 52 04.76	103 18 11.58	17 S	36 E	1	nGRL0821729742	LOVINGTON SAN ANDRES UNIT #073	
API 30-025-03825	OCD spill		OCD	32 52 10.22	103 18 22.31	17 S	36 E	1	nGRL0936352580	LOVINGTON PADDOCK UNIT #048	
API 30-025-03825	OCD spill		OCD	32 52 10.22	103 18 22.31	17 S	36 E	1	nGRL0930831345	LOVINGTON PADDOCK UNIT #048	
API 30-025-34238	OCD spill		OCD	32 56 17.86	103 18 23.04	16 S	36 E	12	nPRS0505531372	STATE 3 #001	
API 30-025-31026	OCD spill		OCD	32 52 17.8	103 18 58.67	16 S	36 E	36	nGRL0909234303	LOVINGTON SAN ANDRES UNIT #063	
API 30-025-03925	OCD spill		OCD	32 50 51.84	103 19 07.51	17 S	36 E	11	nCOH0812732931	PRE-ONGARD WELL #001	
API 30-025-03770	OCD spill		OCD	32 52 23.35	103 19 07.76	16 S	36 E	35	nPRS0420839251	LOVINGTON SAN ANDRES UNIT #027	
API 30-025-03770	OCD spill		OCD	32 52 23.35	103 19 07.76	16 S	36 E	35	nPRS0420839251	LOVINGTON SAN ANDRES UNIT #027	
API 30-025-29712	OCD spill		OCD	32 56 05.9	103 19 23.45	16 S	36 E	11	nCOH0807129681	HUDGENS #001	
API 30-025-37398				32 51 41.76	103 19 27.13	1/ S	36 E	2	nPAC0535533341	EM 2 STATE #001	
API 30-025-33883				32 56 18.17	103 19 39.97	16 S	36 E	11	nGRL0916335520	SV BIG BERTHA #001	
API 30-025-33883				32 56 18.17	103 19 39.97	165	36 E	11	nGRL0902751331		
AMI 3U-U2D-33883				32 30 18.17	103 19 39.97	16.0	30 E	11	mGRLU834056660		
AFI 30-025-33400 ABI 30 025 37456				32 30 U1.05	103 19 45.96	17 0	30 E	11 0	DAC0601026629		
AF1 30-023-37430 API 30 025 03866				32 51 56 04	103 20 33.0	170	36 5	3	nPAC0520624065		
APT 30-023-03000 API 30 025 31260				32 51 20.91	103 21 00.27	17 0	30 E	4 5	nCPI 1134226220		
ΔΡΙ 30_025_31260	OCD spill			32 51 49.14	103 22 00.22	17 9	36 5	5	nGRL 1134220230		
ΔΡΙ 30-025-03891	OCD spill			32 51 49.14	103 22 00.22	17 9	36 =	5	nJ W I0800330112		4
API 30-025-03901	OCD spill			32 51 43.03	103 22 44.03	17.5	36 E	7	nGRI 1006731460	WEST LOVINGTON LINIT #041	4
API 30-025-03729	OCD spill			32 57 23 83	103 23 35 80	16.5	36 F	6	nPRS0513337261	SNYDER B #002	1
			000	02 01 20.00	100 20 00.00	10.0		0	11 100010007201		<u> </u>

			incident	meterial							
site name	operator	incident type	date	spilled	volume	volume	Volume	volume	spill cause	spill source	gw
	241333	Produced Water Release	7/1/20	Produced Water	13	8	5	BBI	Corrosion	Flow Line - Production	No
Grizzly Operating 11 C	258350	Produced Water Release	11/25/19	Produced Water	172	130	42	BBI	Equipment Failure	Valve	No
API 30-025-03816	330447	Produced Water Release	9/30/18	Produced Water	13	13	0	BBL	Equipment Failure	Tank ( Anv)	No
API 30-025-31521	4323	Produced Water Release	8/24/18	Produced Water	20	12	8	BBL	Corrosion	Flow Line - Injection	No
API 30-025-03849	330447	Produced Water Release	9/21/17	Produced Water	0	0	0	BBL	Other	Tank (Any)	No
API 30-025-03833	241333	Produced Water Release	1/18/17	Produced Water	16	13	3	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-41960	113315	Produced Water Release	12/31/14	Produced Water	130	130	0	BBL	Freeze	Valve	No
API 30-025-30964	241333	Produced Water Release	9/2/14	Produced Water	11	0	11	BBL	Blow Out	Well	No
API 30-025-05430	330447	Fire	9/3/18	Produced Water	100	100	0	BBL	Lightning	Tank ( Any)	No
ABO PUMP STATION B-6	324879	Produced Water Release	5/16/18	Produced Water	116	115	1	BBL	Equipment Failure	Pump	No
API 30-025-05430	330447	Produced Water Release	10/27/17	Produced Water	100	90	10	BBL	Corrosion	Tank ( Any)	No
Cobalt Warren Battery	286255	Produced Water Release	10/3/17	Produced Water	10	7	3	BBL	Equipment Failure	Other (Specify)	No
API 30-025-31005	113315	Oil Release	3/13/17	Produced Water	0	0	0	BBL	Equipment Failure	Flow Line - Production	No
STATE V TANK BATTERY	258350	Produced Water Release	3/8/17	Produced Water	0	0	0	BBL	Other	Other (Specify)	No
API 30-025-29440	5691	Produced Water Release	10/29/15	Produced Water	0	0	0	BBL	Equipment Failure	Fitting	No
API 30-025-26323	329772	Produced Water Release	12/12/14	Produced Water	30	25	5	BBL	Equipment Failure	Production Tank	No
API 30-025-31148	241333	Other	12/15/15	Unknown	0	0	0	BBL	Other	Unknown	No
API 30-025-05381	241333	Other	12/15/15	Unknown	0	0	0	BBL	Other	Unknown	No
Pure-Lovington San Andres Unit	[216387] PURE RESOURCES, L.P.	Produced Water Release	8/20/05	Produced Water	150	540	-390	BBL	Equipment Failure	Flow Line - Injection	No
Lovington San Andres Unit	[216387] PURE RESOURCES, L.P.	Produced Water Release	8/5/05	Produced Water	15	5	10	BBL	Other	Flow Line - Injection	No
34Junction South Station	[231749] PLAINS MARKETING, LP	Oil Release	6/10/05	Crude Oil	15	1	14	BBL	Equipment Failure	Injection Header	No
API 30-025-29503	[25575] YATES PETROLEUM CORPORATION	Produced Water Release	7/15/02	Crude Oil	10	5	5	BBL			No
API 30-025-29503	[25575] YATES PETROLEUM CORPORATION	Produced Water Release	7/15/02	Crude Oil	10	5	5	BBL			No
API 30-025-31033		Other	7/9/10	Other (Specify)	2565000	2000000	565000	LBS	Other	Pit (Specify)	No
API 30-025-31033		Other	2/25/10	Other (Specify)	0	0	0	BBL	Normal Operations	Pit (Specify)	No
API 30-025-31033		Other	2/22/10	Other (Specify)	0	0	0	BBL	Other	Unknown	No
API 30-025-05386	[150628] PURE RESOURCES, LP	Produced Water Release	8/5/05	Produced Water	15	5	10	BBL	Other	Flow Line - Injection	No
API 30-025-05391	[189100] CHEVRON MIDCONTINENT, LP	Oil Release	6/30/00	Produced Water	65	50	15	BBL	Equipment Failure	Other (Specify)	No
API 30-025-31548		Produced Water Release	6/8/09	Produced Water	9	0	9	BBL	Corrosion	Flow Line - Production	No
API 30-025-05360	[4323] CHEVRON U S A INC	Produced Water Release	11/22/05	Produced Water	300	0	300	BBL	Normal Operations	Flow Line - Injection	No
API 30-025-30752	[150628] PURE RESOURCES, LP	Produced Water Release	11/22/05	Crude Oil	1	0	1	BBL	Corrosion	Flow Line - Production	No
API 30-025-30752	[[150628] PURE RESOURCES, LP	Produced Water Release	11/22/05	Produced Water	6	4	2	BBL	Corrosion	Flow Line - Production	No
API 30-025-05355	[[216387] PURE RESOURCES, L.P.	Produced Water Release	10/3/99	Produced Water	55	50	5	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-05424		Produced Water Release	7/26/02	Produced Water	150	125	25	BBL			NO
API 30-025-05424		Produced Water Release	7/26/02	Produced water	280	30	250	BBL	Environment Enilyma	Eleveline Dreduction	NO
API 30-025-05357		Produced Water Release	5/14/04		1	1	0	BBL	Equipment Failure	Flow Line - Production	NO
API 30-025-05357		Produced Water Release	3/14/04	Draducad Water	1	1	0			Flow Line - Production	No
API 50-025-21792 Plains Frisco Skolly #1			0/20/04	Crudo Oil	25		25		Corrosion	Dinalina (Any)	Voc
ADI 20 025 21267			6/27/09	Crude Oil	20	15	25		Equipment Epilure		No
API 30-025-31307			12/0/00	Crude Oil	20	35	2		Equipment Failure	Valve	No
APT 30-025-03025			0/24/00	Crude Oil	3	35	 1	BBI	Equipment Failure	Production Tank	No
ΔPI 30-025-34238	[167599] CHESAPEAKE ENERGY MARKETING INC	Oil Release	10/13/04	Crude Oil	240	75	165	BBI		Valve	No
API 30-025-31026		Produced Water Release	3/9/09	Produced Water	12	5	7	BBI	Human Error	Flow Line - Injection	No
API 30-025-03925		Oil Release	1/18/08	Crude Oil	75	60	15	BBI	Corrosion	Other (Specify)	No
API 30-025-03770	[189071] PURE RESOURCES LP	Oil Release	7/21/04	Produced Water	60	60	0	BBI	Equipment Failure	Flow Line - Production	No
API 30-025-03770	[189071] PURE RESOURCES LP	Oil Release	7/21/04	Produced Water	60	60	0	BBI	Equipment Failure	Flow Line - Production	No
API 30-025-29712	[147179] CHESAPEAKE OPERATING, INC.	Oil Release	2/4/08	Crude Oil	5	2	3	BBL		Other (Specify)	No
API 30-025-37398	[113315] TEXLAND PETROLEUM-HOBBS, LLC	Other	12/16/05	Other (Specify)	1	0	1	BBL	Equipment Failure	Other (Specify)	No
API 30-025-33883		Produced Water Release	5/31/09	Produced Water	500	315	185	BBL	Lightning	Production Tank	No
API 30-025-33883		Produced Water Release	1/20/09	Produced Water	120	110	10	BBL	5 5	Tank ( Anv)	No
API 30-025-33883		Produced Water Release	9/11/08	Produced Water	190	160	30	BBL	Corrosion	Flow Line - Production	No
API 30-025-33466		Release Other	2/8/10	Produced Water	0	0	0	BBL			No
API 30-025-37456	[113315] TEXLAND PETROLEUM-HOBBS, LLC	Other	12/20/05	Other (Specify)	1	0	1	BBL	Other	Other (Specify)	No
API 30-025-03866	[150661] TITAN RESOURCES I INC	Produced Water Release	5/10/99	Produced Water	50	15	35	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-31260		Oil Release	12/6/11	Produced Water	5	5	0	BBL	Freeze	Flow Line - Production	No
API 30-025-31260		Oil Release	12/6/11	Crude Oil	1	1	0	BBL	Freeze	Flow Line - Production	No
API 30-025-03891	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	1/3/08	Produced Water	50	1	49	BBL	Equipment Failure		No
API 30-025-03901		Produced Water Release	3/27/09	Produced Water	20	14	6	BBL	Corrosion	Flow Line - Injection	No
API 30-025-03729	[162928] ENERGEN RESOURCES CORPORATION	Oil Release	4/22/05	Produced Water	100	40	60	BBL	Human Error		No

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

				lat.	long.	dysı	ge	tion			
site name	type	ID	agency	WGS84	WGS84	twn	ran	sec	incident number	well name	facility type
API 30-025-35704	OCD spill		OCD	32 58 34.08	103 25 23.88	15 S	35 E	32	nSAP0335031920	WEST LOVINGTON STRAWN UNIT #021	
API 30-025-34829	OCD spill		OCD	32 57 20.73	103 25 33.89	16 S	35 E	2	nPAC0604048727	TOWNSEND STATE #009	
API 30-025-21185	OCD spill		OCD	32 53 31.64	103 25 38.19	16 S	35 E	26	nGRL1315035826	EIDSON #001	
API 30-025-02719	OCD spill		OCD	32 56 44.42	103 25 49.36	16 S	35 E	2	nGRL0921756124	STATE TB #001	
API 30-025-02719	OCD spill		OCD	32 56 44.42	103 25 49.36	16 S	35 E	2	nGRL0921756124	STATE TB #001	
Pure Lovington San Andres Unit 2" FG Inj Lateral	OCD spill, 1RP	1RP-40-0		32 31 34.72	103 10 16	16 S	37 E	31	nLWJ0523631683		Pipeline - Water
Pure Lovington SA Unit 18 Leak	OCD spill, 1RP	1RP-329-0, 1RP-48-0		32 31 34.72	103 10 16	16 S	37 E	32	nLWJ0527053495		Pipeline - Water
Plains Frisco Skelly 6 # 2 Ref. 2004-00197		1RP-767, 1RP-42		32 31 13.70	103 10 25.79	1/5	37 E	6	nLVVJU523857888		Tank Dattan
Chovron Lovington Doddook Unit		1RP-1184		32 31 19.2	103 10 50.88	105	30 E	30	nPAC0712949646		Tank Battery
Chevron Lovington Paddock Onit		1RF-930		32 23 21.40	103 10 35.92	16 9	30 E	11	nPAC0017434320		Tank Rattony
Chesapeake Buth 20-2 160011	OCD spill, TRP	1RP		32 32 40.21	103 13 32 67	16.5	36 E	20	nPAC0606228112		Tank Battery
TNM 98-04 Texas New Mexico Pipeline Company	OCD spill, TRP	1RP-95-0		32 32 41.23	103 13 32.07	10 S	36 E	20	nPAC0529731964		
Energen West Lovington Strawn Unit 1 #15	OCD spill, 1RP	1RP-1009-0		32 34 39	103 14 06 72	16 S	36 E	6	nPAC0624051726		Tank Battery
Plains Lovington Gathering WTI	OCD spill 1RP	1RP-838-0		32 51 56 19	103 17 08 74	17 S	37 E	6	nPAC0611638542		
API 30-025-05360	OCD spill, 1RP	1RP-1343_1RP-1222	OCD	32 52 36.33	103 17 19.09	16 S	37 E	31	nPAC0718738372	OVINGTON SAN ANDRES UNIT #016	
API 30-025-05360	OCD spill, 1RP	1RP-1343, 1RP-1222	OCD	32 52 36.33	103 17 19.09	16 S	37 E	31	nPRS0530448610	LOVINGTON SAN ANDRES UNIT #016	1
API 30-025-05360	OCD spill, 1RP	1RP-1343, 1RP-1222	OCD	32 52 36.33	103 17 19.09	16 S	37 E	31	nSAD0530554707	LOVINGTON SAN ANDRES UNIT #016	1
API 30-025-05368	OCD spill, 1RP	1RP-1602	OCD	32 52 33.06	103 17 19.1	16 S	37 E	31	nPAC0727451382	STATE O #012	
C S CAYLER EOTT SPILL	OCD spill, 1RP	1RP-382-0	OCD	32 52 02.62	103 17 19.98	17 S	37 E	6	nPRS0524555460		
API 30-025-05351	OCD spill, 1RP	1RP-1477, 1RP-1438	OCD	32 52 19.99	103 17 38.36	16 S	37 E	31	nPAC0718639786	LOVINGTON SAN ANDRES UNIT #022	
API 30-025-05351	OCD spill, 1RP	1RP-1477, 1RP-1438	OCD	32 52 19.99	103 17 38.36	16 S	37 E	31	nPAC0718738011	LOVINGTON SAN ANDRES UNIT #022	
API 30-025-05351	OCD spill, 1RP	1RP-1477, 1RP-1438	OCD	32 52 19.99	103 17 38.36	16 S	37 E	31	nPAC0718738011	LOVINGTON SAN ANDRES UNIT #022	
API 30-025-31084	OCD spill, 1RP	1RP-1665	OCD	32 52 27.31	103 17 40.18	16 S	37 E	31	nPAC0733355534	LOVINGTON PADDOCK UNIT #096	
API 30-025-05430	OCD spill, 1RP	1RP-2557-0, 1RP-2553-0	OCD	32 52 10.19	103 17 49.97	17 S	37 E	6	nLWJ1016132531	C S CAYLOR SR ESTATE #003	
API 30-025-05430	OCD spill, 1RP	1RP-2557-0, 1RP-2553-0	OCD	32 52 10.19	103 17 49.97	17 S	37 E	6	nLWJ1015956699	C S CAYLOR SR ESTATE #003	
API 30-025-03747	OCD spill, 1RP	1RP-1604	OCD	32 53 12.15	103 18 01.38	16 S	36 E	25	nPAC0727726121	LOVINGTON PADDOCK UNIT #007	
Navajo Lovington Refinery	OCD spill, 1RP	1RP-1650	OCD	32 05 16.62	103 18 01.41	16 S	36 E	36	nPAC0730639780		Remediate
Navajo Lovington Refinery	OCD spill, 1RP	1RP-1650	OCD	32 05 16.62	103 18 01.41	16 S	36 E	36	nPAC0730337638		Remediate
Navajo Lovington Refinery	OCD spill, 1RP	1RP-1650	OCD	32 05 16.62	103 18 01.41	16 S	36 E	36	nPRS0528657549		Remediate
API 30-025-03806	OCD spill, 1RP	1RP-1225	OCD	32 52 33.05	103 18 02.79	16 S	36 E	36	nSAD0530554879	LOVINGTON PADDOCK UNIT #033	
API 30-025-03806	OCD spill, 1RP	1RP-1225	OCD	32 52 33.05	103 18 02.79	16 S	36 E	36	nSAD0530554879	LOVINGTON PADDOCK UNIT #033	
API 30-025-34141	OCD spill, 1RP	1RP-1713	OCD	32 54 32.64	103 18 04.53	16 S	36 E	24	nPAC0801452097	GILMORE 24 #001	
API 30-025-34141	OCD spill, 1RP	1RP-1713	OCD	32 54 32.64	103 18 04.53	16 S	36 E	24	nPAC0801737182	GILMORE 24 #001	
API 30-025-03813	OCD spill, 1RP	1RP-1228	OCD	32 51 57.14	103 18 05.56	17 S	36 E	1	nPAC0535547966	LOVINGTON SAN ANDRES UNIT #040	
API 30-025-03781	OCD spill, 1RP	1RP-1216		32 52 23.26	103 18 05.56	16 S	36 E	36	nPAC0706832335	LOVINGTON SAN ANDRES UNIT #024	
API 30-025-31275		1RP-1235		32 52 04.77	103 18 12.88	175	36 E	1	nPAC0711538356		
API 30-025-31275		1RP-1235		32 52 04.77	103 18 12.88	1/5	30 E	26	nPAC0711538356		
API 30-025-31108		1RP-1400		32 52 57.63	103 18 15.79	165	30 E	30	nPAC0716532025		
API 30-025-31100		1RP-1400		32 52 57.03	103 18 15.79	16.5	30 E	30	nPAC07 16532025		
API 30-025-03802	OCD spill, TRP	1PP 308		32 52 47 22	103 18 20.90	16 5	30 E	36	nPAC0003227273		
API 30-025-03826	OCD spill, TRP	1RP-915		32 51 56 17	103 18 20.90	17.5	36 E	1	nPAC0616540406		
API 30-025-03826	OCD spill, 1RP	1RP-915		32 51 56 17	103 18 21 1	17 S	36 E	1	nPAC0616540406		+
API 30-025-03782	OCD spill 1RP	1RP-1504		32 52 23 28	103 18 21 11	16.5	36 E	36	nPAC0721455807	LOVINGTON SAN ANDRES UNIT #025	
Chevron Midway State Tank Battery	OCD spill, 1RP	1RP-1471	OCD	32 51 01 26	103 18 30.96	17 S	36 F	12	nPAC0718648577		Tank Battery
Chevron Midway State Tank Battery	OCD spill, 1RP	1RP-1471	OCD	32 51 01.26	103 18 30.96	17 S	36 F	12	nPAC0718648577		Tank Battery
API 30-025-03927	OCD spill, 1RP	1RP-1227	OCD	32 51 08.12	103 18 32.6	17 S	36 E	12	nPAC0711046846	LOVINGTON PADDOCK UNIT #081	
API 30-025-03927	OCD spill, 1RP	1RP-1227	OCD	32 51 08.12	103 18 32.6	17 S	36 E	12	nPAC0535539580	LOVINGTON PADDOCK UNIT #081	
API 30-025-03927	OCD spill, 1RP	1RP-1227	OCD	32 51 08.12	103 18 32.6	17 S	36 E	12	nPAC0535539580	LOVINGTON PADDOCK UNIT #081	
API 30-025-03831	OCD spill, 1RP	1RP-1498	OCD	32 51 57.18	103 18 32.75	17 S	36 E	1	nPAC0721134644	LOVINGTON PADDOCK UNIT #060	
API 30-025-31571	OCD spill, 1RP	1RP-1395	OCD	32 51 51.78	103 18 41.69	17 S	36 E	1	nPAC0715050131	LOVINGTON PADDOCK UNIT #139	
API 30-025-31571	OCD spill, 1RP	1RP-1395	OCD	32 51 51.78	103 18 41.69	17 S	36 E	1	nPAC0715050131	LOVINGTON PADDOCK UNIT #139	
API 30-025-31570	OCD spill, 1RP	1RP-789	OCD	32 52 03.15	103 18 55.27	17 S	36 E	1	nPAC0607925034	LOVINGTON PADDOCK UNIT #136	
API 30-025-31570	OCD spill, 1RP	1RP-789	OCD	32 52 03.15	103 18 55.27	17 S	36 E	1	nPAC0607925034	LOVINGTON PADDOCK UNIT #136	
API 30-025-03848	OCD spill, 1RP	1RP-937	OCD	32 52 10.29	103 19 03.9	17 S	36 E	2	nPAC0617931420	LOVINGTON PADDOCK UNIT #045	
Plains 34 Junction South	OCD spill, 1RP	1RP-456-0	OCD	32 51 02.55	103 19 04.47	17 S	36 E	2	nEEM0527236006		<u></u>
API 30-025-37902	OCD spill, 1RP	1RP-1849-0	OCD	32 51 17.98	103 19 07.62	17 S	36 E	11	nCOH0812731977	ANGELL #001	4
API 30-025-29712	OCD spill, 1RP	1RP-1712	OCD	32 56 05.9	103 19 23.45	16 S	36 E	11	nPAC0801736858	HUDGENS #001	
Chesapeake NH 35 #1	OCD spill, 1RP	1KP-894	OCD	32 34 56.21	103 20 43.87	15 S	35 E	35	nPAC0614434084		Tank Battery

						_	_				
- 14		in cide of two c	incident	material	volume	volume	volume	volume			gw
Site name			date	spilled	spilled	recovered	lost	units	spill cause	Spill Source	Impact
API 30-025-35704		Oll Release	T/T/03	Other (Specify)	30	15	15	BBL	Human Error	Production Tank	NO
API 30-025-34829	[6137] DEVON ENERGY PRODUCTION COMPANY, LP	Other Draduaad Water Balagaa	5/4/04	Other (Specify)	50	0	50	GAL	Other	Other (Specify)	NO
API 30-025-21105		Oil Pologoo	7/15/00	Crude Oil	20	0	20	DDL	Corregion	Flow Line Breduction	NO
API 30-025-02719			7/15/09	Draduced Water	3	2	1	DDL	Corregion	Flow Line - Production	NO
APT 50-025-027 19 Duro Lovington Son Andros Unit 2" EG Ini Latoral		Dir Release	8/20/05	Produced Water	150	<u> </u>	10		Corrosion Equipment Failure	Flow Line - Production	No
Pure Lovington SA Unit 18 Look		Oil Polosso	0/1/04	Condonasto	0	140	10		Equipment Failure	Pipeline (Any)	No
Plains Erisco Skelly 6" # 2 Ref 2004 00107			9/1/04		10	0	10	BBI	Corrosion	Pipeline (Any)	No
XOG Skelly State O Battery			1/21/07		20	9	10	BBI	Other	Tank ( Any)	No
Chevron Lovington Paddock Unit		Produced Water Release	6/17/06	Produced Water	20	170	30	BBI	Equipment Failure	Flow Line - Injection	No
Chesaneake SV Chinshot #160037			11/4/05		200	0	0	BBI		Tank ( Any)	No
Chesapeake Buth 20-2 160011		Other	6/4/05		500	0	500	GAL	Vandalism	Tank ( Any)	No
TNM 98-04 Texas New Mexico Pipeline Company	[184614] TEXAS NEW MEXICO PIPELINE COMPANY	Oil Release	1/31/98	Crude Oil	30	25	5	BBI	Corrosion	Pipeline (Any)	No
Energen West Lovington Strawn Unit 1 #15	[229025] ENERGEN RESOURCES CORP	Oil Release	8/6/06	Crude Oil	155	0	155	BBI	Corrosion	Tank ( Any)	No
Plains Lovington Gathering WTI		Oil Release	4/21/06	Crude Oil	12	8	4	BBI	Corrosion	Pipeline (Anv)	Yes
API 30-025-05360		Produced Water Release	10/10/05	Produced Water	220	160	60	BBI	Corrosion	Flow Line - Injection	No
API 30-025-05360	[150628] PURE RESOURCES LP	Produced Water Release	10/10/05	Produced Water	220	160	60	BBI	Corrosion	Flow Line - Injection	No
API 30-025-05360	[150628] PURE RESOURCES, LP		10/10/05	Produced Water	220	160	60	BBI	Equipment Failure	Flow Line - Injection	No
API 30-025-05368	[15422] APACHE CORP	Oil Release	9/27/07	Crude Oil	2	0	2	BBI	Equipment Failure	Well	No
C S CAYLER FOTT SPILL	[214984] PLAINS MARKETING, L.P.	Oil Release	9/19/02	Crude Oil	80	0	80	BBI	Corrosion	Pipeline (Anv)	Yes
API 30-025-05351	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	6/16/07	Produced Water	10	0	10	BBI	Corrosion	Flow Line - Production	No
API 30-025-05351	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	6/4/07	Produced Water	35	20	15	BBL		Flow Line - Production	No
API 30-025-05351	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	6/4/07	Crude Oil	1	0	1	BBL		Flow Line - Production	No
API 30-025-31084	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	11/16/07	Produced Water	5	0	5	BBL		Flow Line - Injection	No
API 30-025-05430		Produced Water Release	6/9/10	Produced Water	5	2	3	BBL	Human Error	Flow Line - Injection	No
API 30-025-05430		Produced Water Release	5/22/10	Produced Water	50	40	10	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-03747	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	9/26/07	Produced Water	20	15	5	BBL		Pipeline (Any)	No
Navajo Lovington Refinery	[15694] NAVAJO REFINING CO. PIPELINE DIVISION	Oil Release	10/25/07	Crude Oil	0	2	0	BBL	Corrosion	Pipeline (Any)	Yes
Navajo Lovington Refinery	[15694] NAVAJO REFINING CO. PIPELINE DIVISION	Oil Release	10/10/07	Crude Oil	20	5	15	BBL	Equipment Failure	Valve	Yes
Navajo Lovington Refinery	[94081] NAVAJO REFINING CO	Other	10/13/05	Diesel	50	0	50	BBL	Equipment Failure		Yes
API 30-025-03806	[150628] PURE RESOURCES, LP		11/1/05	Produced Water	100	0	0	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-03806	[150628] PURE RESOURCES, LP		11/1/05	Crude Oil	3	0	0	BBL	Equipment Failure		No
API 30-025-34141	[147179] CHESAPEAKE OPERATING, INC.	Produced Water Release	1/4/08	Produced Water	60	52	8	BBL	Freeze	Valve	No
API 30-025-34141	[147179] CHESAPEAKE OPERATING, INC.	Oil Release	1/4/08	Crude Oil	60	52	8	BBL	Freeze	Valve	No
API 30-025-03813	[216387] PURE RESOURCES, L.P.	Produced Water Release	12/11/05	Produced Water	20	0	20	BBL	Freeze	Flow Line - Production	No
API 30-025-03781	[247589] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	2/14/07	Produced Water	200	30	170	BBL	Corrosion	Fitting	No
API 30-025-31275	[4323] CHEVRON U S A INC	Produced Water Release	5/31/06	Produced Water	20	10	10	BBL		Pipeline (Any)	No
API 30-025-31275	[4323] CHEVRON U S A INC	Produced Water Release	5/31/06	Crude Oil	2	0	2	BBL		Pipeline (Any)	No
API 30-025-31108	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	5/30/07	Produced Water	5	0	5	BBL	Corrosion	Flow Line - Production	No
API 30-025-31108	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	5/30/07	Crude Oil	1	0	1	BBL	Corrosion	Flow Line - Production	No
API 30-025-03802	[150628] PURE RESOURCES, LP	Produced Water Release	1/26/03	Produced Water	230	130	100	BBL		Pipeline (Any)	No
API 30-025-03802	[189071] PURE RESOURCES LP	Produced Water Release	1/26/03	Produced Water	230	130	100	BBL		Flow Line - Injection	No
API 30-025-03826	[216419] CHEVRON TEXACO EXPLORATION & PRODUCTION CO.	Produced Water Release	6/4/06		0	0	0	BBL			No
API 30-025-03826	[216419] CHEVRON TEXACO EXPLORATION & PRODUCTION CO.	Produced Water Release	6/4/06	Produced Water	40	10	30	BBL	Corrosion	Flow Line - Injection	No
API 30-025-03782	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	7/26/07	Produced Water	20	0	20	BBL	Equipment Failure	Flow Line - Injection	No
Chevron Midway State Tank Battery	[4323] CHEVRON U S A INC	Oil Release	5/16/07	Crude Oil	157	156	1	BBL	Equipment Failure	Separator	No
Chevron Midway State Tank Battery	[4323] CHEVRON U S A INC	Oil Release	5/16/07	Produced Water	66	64	2	BBL	Equipment Failure	Separator	No
API 30-025-03927		Produced Water Release	1/30/06	Produced Water	0	0	0	BBL			No
API 30-025-03927		Produced Water Release	12/10/05	Crude Oil	1	0	1	BBL	Freeze	Flow Line - Production	NO
API 30-025-03927		Produced Water Release	12/10/05	Produced Water	5	3	2	BBL	Freeze	Flow Line - Production	NO
API 30-025-03831		Produced Water Release	7/13/07	Produced Water	50	0	50	RRF	Equipment Failure		NO
API 30-025-31571			12/11/06		1	0	1	BBL	Corrosion	Flow Line - Production	NO
AMI 30-025-31571 ADI 20.025-21570			12/11/06	Crude Oil	ŏ ₄	4	4	BBF BBF	Corrosion	Flow Line - Production	NO No
AFI 30-025-31370			3/15/00	Droduced Water	1	U 40	1	DDL DDI		Flow Line - Production	INO No
AF1 30-020-313/0 AD1 20 025 02049		Draduand Water Dalage	3/15/00	Produced Water	14	13 F	F	DBL	Corregion	FIOW LINE - Production	INO No
AFI JU-U2J-UJ040 Plains 24 Junction South			0/20/05		10	5	5	DDL	CUITUSIUII	Dit (Specify)	NO Vec
			3120100		0	10	0	DDL	⊑quipment rallure	Othor (Specify)	Tes No
AF1 30-023-37902 AFI 30 025 20712		Droduced Water Palaace	4/30/00	Droduced Mater	20	10	∠ 		Freeze	Tank ( Any)	No
Chesaneaka NH 35 #1			5/17/06		40	<u>عد</u>	125	BDL	Ather	Tank ( Any)	No
Onesapeare NTI 30 #1			0/17/00		100	U	100	DDL		rank (Any)	INU

JOHN SHOMAKER & ASSOCIATES, INC. WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS

				1-4	lawa	shp	Je	ion			
site name	type	ID	agency	uat, WGS84	WGS84	ŝun	สมดู	sect	incident number	well name	facility type
API 30-025-03869	OCD spill, 1RP	1RP-1041	OCD	32 51 44.06	103 21 27.37	17 S	36 E	4	nPAC0626351274	WEST LOVINGTON UNIT #024	
API 30-025-03873	OCD spill. 1RP	1RP-2563	OCD	32 51 43.98	103 21 42.72	17 S	36 E	4	nLWJ1016954547	WEST LOVINGTON UNIT #023	
API 30-025-03873	OCD spill, 1RP	1RP-2563	OCD	32 51 43.98	103 21 42.72	17 S	36 E	4	nPAC0530648539	WEST LOVINGTON UNIT #023	
API 30-025-03873	OCD spill, 1RP	1RP-2563	OCD	32 51 43.98	103 21 42.72	17 S	36 E	4	nPAC0530648539	WEST LOVINGTON UNIT #023	
API 30-025-03920	OCD spill, 1RP	1RP-1314	OCD	32 51 17.77	103 21 58.28	17 S	36 E	9	nPAC0712954774	WEST LOVINGTON UNIT #047	
API 30-025-03920	OCD spill, 1RP	1RP-1314	OCD	32 51 17.77	103 21 58.28	17 S	36 E	9	nPAC0708526071	WEST LOVINGTON UNIT #047	
API 30-025-21885	OCD spill, 1RP	1RP-1992-0	OCD	32 51 07.86	103 22 17.69	17 S	36 E	8	nPLM0830342476	WEST LOVINGTON UNIT #057	
API 30-025-03911	OCD spill, 1RP	1RP-930	OCD	32 51 04.53	103 22 29.36	17 S	36 E	8	nPAC0617348887	WEST LOVINGTON UNIT #056	
API 30-025-03910	OCD spill, 1RP	1RP-942	OCD	32 51 17.59	103 22 29.37	17 S	36 E	8	nPAC0618726574	WEST LOVINGTON UNIT #045	
API 30-025-03916	OCD spill, 1RP	1RP-1226	OCD	32 51 04.44	103 22 44.57	17 S	36 E	8	nPAC0711047384	WEST LOVINGTON UNIT #055	
API 30-025-36866	OCD spill, 1RP	1RP	OCD	32 54 48.23	103 22 58.53	16 S	36 E	20	nLWJ0517833893	RUTH 20 #002	
API 30-025-36866	OCD spill, 1RP	1RP	OCD	32 54 48.23	103 22 58.53	16 S	36 E	20	nLWJ0523030366	RUTH 20 #002	
Lovington Deep 6" EOTT Spill	OCD spill, 1RP	1RP-383-0	OCD	32 52 01.27	103 22 59.79	17 S	36 E	6	nEEM0528954783		
API 30-025-31521	OCD spill, 1RP	1RP-301	OCD	32 51 17.26	103 23 00.9	17 S	36 E	8	nPAC0535626275	WEST LOVINGTON UNIT #099	
API 30-025-26823	OCD spill, 1RP	1RP-1993-0	OCD	32 51 17.41	103 23 01.31	17 S	36 E	8	nCOH0830339905	WEST LOVINGTON UNIT #063	
API 30-025-31451	OCD spill, 1RP	1RP-1612	OCD	32 51 36.82	103 23 06.59	17 S	36 E	5	nPAC0728432741	WEST LOVINGTON UNIT #086	
API 30-025-31451	OCD spill, 1RP	1RP-1612	OCD	32 51 36.82	103 23 06.59	17 S	36 E	5	nPAC0728432741	WEST LOVINGTON UNIT #086	
API 30-025-34606	OCD spill, 1RP	1RP-1533	OCD	32 58 03.38	103 23 08.11	15 S	35 E	35	nPAC0725448148	WEST LOVINGTON STRAWN UNIT #017	
API 30-025-37846	OCD spill, 1RP	1RP-1721	OCD	32 58 06.52	103 23 39.24	15 S	35 E	34	nPAC0801736209	WEST LOVINGTON STRAWN UNIT #023	
API 30-025-32291	OCD spill, 1RP	1RP-2457-0	OCD	32 58 19.47	103 24 06.34	15 S	35 E	34	nLWJ1008455608	WEST LOVINGTON STRAWN UNIT #008	
API 30-025-32291	OCD spill, 1RP	1RP-2457-0	OCD	32 58 19.47	103 24 06.34	15 S	35 E	34	nLWJ1010242624	WEST LOVINGTON STRAWN UNIT #008	
API 30-025-32852	OCD spill, 1RP	1RP-2482-0	OCD	32 58 44.49	103 24 38.77	15 S	35 E	33	nLWJ1011030039	WEST LOVINGTON STRAWN UNIT #011	
API 30-025-34624	OCD spill, 1RP	1RP-1137	OCD	32 56 32.87	103 24 41.48	16 S	35 E	12	nPAC0633828603	KALA 12 #001	
API 30-025-29565	OCD spill, 1RP	1RP-2563-0	OCD	32 58 32.97	103 25 58.63	15 S	35 E	32	nLWJ1016951614	BAER #001	
API 30-025-29565	OCD spill, 1RP	1RP-2563-0	OCD	32 58 32.97	103 25 58.63	15 S	35 E	32	nPRS0413153858	BAER #001	
Pure Resources Spill Site 28-1	OCD spill, 1RP	1RP-332	OCD	32 20 42.36	103 27 43.92	17 S	36 E	6	nPAC0535629884		
	OCD spill		OCD	-	-	16 S	35 E	11	iAUTOfRM000696	TNM-97-04 (Townsend)	
	OCD spill		OCD	-	-	16 S	36 E	5	nPAC0534854597	Energen Resouces WLSU #18	Tank Battery
	OCD spill, 1RP		OCD	-	-	16 S	36 E	12	nPAC0616536372	Plains Chesapeake State 3 #1	Tank Battery
	OCD spill		OCD	-	-	16 S	36 E	15	iAUTOfSC000454	PRO-KEM - LOVINGTON	Service Company
	OCD spill, 1RP		OCD	-	-	16 S	37 E	31	iAUTOfAB000006	ABO SWD SYSTEM JUNCTION L-31(LOVINGTON #6)	Pipeline - Water
	OCD spill		OCD	-	-	17 S	36 E	1	nPAC0607925594	Pure Resources Lovington Paddock Test Station #7	
	OCD spill		OCD	-	-	17 S	36 E	1	nPAC0607925594	Pure Resources Lovington Paddock Test Station #7	
	OCD spill		OCD	-	-	17 S	36 E	1	nSAD0534947630	LOVINGTON PADDOCK SAN ANDRES BTY	Tank Battery
	OCD spill, 1RP		OCD	-	-	17 S	36 E	1	nPAC0535547665	Pure Resources Lovington Paddock Battery	Tank Battery
	OCD spill		OCD	-	-	17 S	36 E	1	iAUTOfLWP00359	Lovington Well Field	Pipeline - Water
	OCD spill, 1RP		OCD	-	-	17 S	36 E	5	nPAC0718639351	Chevron West Lovington Unit	Injection Plant
	OCD spill, 1RP		OCD	-	-	17 S	36 E	5	nPAC0614230052	Chevron West Lovington Unit	Injection Plant
	OCD spill		OCD	-	-	17 S	36 E	5	nPAC0604730807	Pure Resources West Lovington Unit	Injection Plant
	OCD spill		OCD	-	-	17 S	36 E	12	nPAC0535548498	Pure Resources Midway State Battery #1	Tank Battery

1RP - OCD remediation permit (Hobbs area)

			incident	matorial	volumo	volumo	volumo	volumo			<b>GW</b>
site name	operator	incident type	date	spilled	snilled	recovered	lost	units	snill cause	spill source	impact
API 30-025-03869	[4323] CHEVRON U S A INC	Produced Water Release	7/6/06	Produced Water	225	220	5	BBI	Human Error	Well	No
API 30-025-03873		Produced Water Release	6/18/10	Produced Water	7	5	2	BBI	Equipment Failure	Flow Line - Injection	No
API 30-025-03873	[216387] PURE RESOURCES, L.P.	Produced Water Release	5/11/99	Produced Water	150	150	0	BBL	Equipment Failure	Flow Line - Injection	No
API 30-025-03873	[216387] PURE RESOURCES, L.P.	Produced Water Release	5/11/99		0	0	0	BBL			No
API 30-025-03920	[4323] CHEVRON U S A INC	Produced Water Release	1/14/07	Produced Water	5	0	5	BBL	Corrosion	Flow Line - Injection	No
API 30-025-03920	[4323] CHEVRON U S A INC	Produced Water Release	1/14/07	Produced Water	5	0	5	BBL	Corrosion	Flow Line - Injection	No
API 30-025-21885	[4323] CHEVRON U S A INC	Other		Unknown	0	0	0	BBL	Other	Unknown	No
API 30-025-03911	[4323] CHEVRON U S A INC	Produced Water Release	4/26/06	Produced Water	25	20	5	BBL	Corrosion	Flow Line - Injection	No
API 30-025-03910	[216419] CHEVRON TEXACO EXPLORATION & PRODUCTION CO.	Produced Water Release	6/21/06	Produced Water	5	0	5	BBL	Corrosion	1	No
API 30-025-03916	[4323] CHEVRON U S A INC	Produced Water Release	4/20/07	Produced Water	0	0	0	BBL	-		No
API 30-025-36866	[233935] CHESAPEAKE ENERGY CORP	Other	6/3/05	Diesel	500	0	500	GAL	Vandalism	Other (Specify)	No
API 30-025-36866	[147179] CHESAPEAKE OPERATING, INC.	Other	6/3/05	Diesel	500	0	500	GAL	Other	Other (Specify)	No
Lovington Deep 6" EOTT Spill	[214984] PLAINS MARKETING, L.P.	Oil Release	12/12/02	Crude Oil	25	10	15	BBL	Corrosion	Pipeline (Any)	Yes
API 30-025-31521	[150628] PURE RESOURCES, LP	Produced Water Release	6/23/05	Produced Water	100	45	55	BBL	Corrosion	Flow Line - Injection	No
API 30-025-26823		Other	4/1/07	Unknown	0	0	0	BBL	Other	Unknown	No
API 30-025-31451	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	10/2/07	Crude Oil	2	1	1	BBL	-	Pipeline (Anv)	No
API 30-025-31451	[241333] CHEVRON MIDCONTINENT, L.P.	Produced Water Release	10/2/07	Produced Water	20	13	7	BBL		Pipeline (Anv)	No
API 30-025-34606	[162928] ENERGEN RESOURCES CORPORATION	Produced Water Release	8/31/07	Produced Water	45	35	10	BBL		Flow Line - Production	No
API 30-025-37846	[162928] ENERGEN RESOURCES CORPORATION	Oil Release	8/31/07	Crude Oil	45	35	10	BBL		Flow Line - Production	No
API 30-025-32291		Other	11/25/09	Other (Specify)	0	0	0	BBL	Other	Unknown	No
API 30-025-32291	[162928] ENERGEN RESOURCES CORPORATION	Other	10/26/09	Other (Specify)	1	0	0	BBL	Other	Unknown	No
API 30-025-32852		Produced Water Release	11/10/09	Produced Water	30	15	15	BBL	Corrosion	Other (Specify)	No
API 30-025-34624	[147179] CHESAPEAKE OPERATING, INC.	Produced Water Release	12/1/06	Produced Water	15	10	5	BBL	Freeze	Tank (Any)	No
API 30-025-29565		Produced Water Release	6/11/10	Produced Water	10	9	1	BBL	Other		No
API 30-025-29565	[162928] ENERGEN RESOURCES CORPORATION	Produced Water Release	1/2/04	Produced Water	200	90	110	BBL	Human Error		No
Pure Resources Spill Site 28-1	[150628] PURE RESOURCES, LP	Oil Release	9/15/05	Crude Oil	0	0	0	BBL			No
			1/16/07	Crude Oil	188	5	/83	BBI	Corrosion	Dipeline (Any)	Ves
			12/4/05	Crude Oil	400	13	400	BBI	Human Error	Production Tank	No
			6/5/06	Crude Oil	10	30	10	BBI		Tank ( Any)	No
		Belease Other	7/24/05		49	- <u></u>	0	BBI	Equipment Epilure	Linknown	Vec
		Release Other	8/11/05	Droduced Water	0	0	0	BBI	Equipment Failure		Vec
			3/9/06		1	0	1	BBI		Other (Specify)	No
			3/9/06	Produced Water	23	20	3	BBI		Other (Specify)	No
		Oli Kelease	12/12/05	Brine Water	20	20	0	BBI	Freeze	Tank (Any)	No
		Produced Water Release	12/12/05	Drine Water	<u> </u>	35	5	BBI	Freeze		No
		Release Other	10/8/03	Produced Water	40	0	0	BBI	Fauinment Failure	Dipeline (Any)	Vec
		Produced Water Release	6/11/07	Produced Water	625	610	15	BRI	Human Error	Pipeline (Any)	No
		Produced Water Release	5/11/06	Produced Water	100	010 00	10	BBI	Equipment Failure	Fitting	No
		Produced Water Release	2/6/06	Produced Water	35	30	5	BBI	Equipment Failure	Pump	No
		Produced Water Pelace	12/8/05	Produced Water	10	10	0	BBI	Eroozo	Other (Specify)	No
	III 10020 FOR RESOURCES, LF	FIGURE WALE REPASE	12/0/03	FIGUICEU Waler	10	10	0	DDL	116626		INU

1RP - OCD remediation permit (Hobbs area)

Appendix F.

City of Lovington water rights and permits summary

## Appendix F. City of Lovington water rights and permits summary

### L-4058 thru L-4058-S-12 & L-70 Comb; L-53-AA, L-1702, L-1703 & L-1704-Comb-A

Permit L-4058 thru L-4058-S-12 & L-70 Comb was issued for 3,586.34 ac-ft/yr on January 17, 1955. To this total, 45 ac-ft/yr were added under L-1702, L-1703 & L-1704-Comb-A on January 9, 1963, and 65.8 ac-ft/yr were added under L-53-AA on November 15, 1965, for a new total of 3,697.14 ac-ft/yr. The wells are located in Township 16 South, Range 36 East.

A December 16, 2009 NMOSE memorandum states that "As of year 2000 the maximum amount of water applied to beneficial use for the City of Lovington was 2335.42 acre-feet per annum." This number corresponds to the metered diversion from City wells in Township 16 South, Range 36 East between October 1, 1999 and September 30, 2000. However, a higher metered diversion of 2,511.6 ac-ft/yr was reported for the period January 1 to December 31, 1995 (see April 22, 1998 NMOSE memorandum regarding L-5164 into L-5486).

Note that well L-4058-S-23(T) (City Well 17) was permitted as a recovery well for groundwater remediation in 1996. Additional statements on the permit application submitted by Navajo Refining Company indicate, "The recovered water will replace water currently supplied by a water well owned by the City of Lovington and, as such, will be utilized in the desalting system as make-up water for crude oil washing purposes...After leaving the desalter system, the water stream undergoes additional treatment (product separation, volatile stripping, steam heating, etc.) prior to being released into the City of Lovington publicly owned treatment works along with site discharge water."

A permit was granted by NMOSE in 2019 to replace well L-4058-S-30 with L-4058-POD26 within 100 ft of the existing well. The replacement of the existing well was sought due to failure of the well screen. Conditions of approval indicate that "a totalizing meter of a type approved by and installed in a manner and at a location acceptable to the State Engineer shall be installed on the discharge line from all equipped wells..." The permit conditions make no mention of a reporting requirement, only that NMOSE be advised of the initial meter reading. The permit conditions make no mention of plugging and abandonment of L-4058-S-30, although it is recommended to do so according to an NMOSE-approved Plugging Plan in order to prevent any potential contamination that could migrate along the well bore.

## L-208, L-208-S

The City holds a licensed water right for 967.84 ac-ft/yr (up to 600 gpm) for municipal use under L-208 and L-208-S. The license for up to 600 gpm was issued on January 30, 1947. The wells are located in Township 16 South, Range 36 East.

## L-4984; L-1718, L-1719, L-4957, L-4984, L-5060 & L-5458-Comb-S

Permit L-1718, L-1719, L-4957, L-4984, L-5060 & L-5458-Comb-S was issued for 761.6 ac-ft/yr on January 27, 1966. To this total, 333 ac-ft/yr were added under L-4984-Enlarged on August 4, 1967, for a total of 1,094.6 ac-ft/yr. The wells are located in Township 16 South, Range 37 East.

A December 1, 2006 NMOSE memorandum states that "For the year 2000, the maximum amount of water applied to beneficial use was 1,039.22 acre-feet per annum." This number corresponds to the metered diversion from City wells in Township 16 South, Range 37 East between October 1, 1999 and September 30, 2000. However, it should be noted that a higher metered diversion of 1,301.21 ac-ft/yr was reported for the period October 1, 1997 to September 30, 1998 (see November 13, 2000 NMOSE memorandum).

## L-5486 & L-5486-S; L-5164 into L-5486

Permit L-5184 into L-5486 was issued for 160 ac-ft/yr on July 27, 1982. To this total, 98 ac-ft/yr were added under L-5456, L-5486, and L-5487 on May 15, 1965, for a total of 258 ac-ft/yr. The wells are located in Township 17 South, Range 36 East.

A December 16, 2009 NMOSE memorandum states that "As of the year 2001 the maximum annual diversion of water applied to beneficial use was 233.32 acre-feet per annum." This number corresponds to the metered diversion from wells under L-5486 & L-5486-S; L-5164 into L-5486 in Township 16 South, Range 37 East for the calendar year 1999.

## L-1716 and L-2481

The City holds licensed water rights for irrigation use in Township 17 South, Range 36 East under L-1716 and L-2481. License L-1716 was issued for 127.1 acres of irrigated crop land at 3 ac-ft/ac on March 1, 1963, for a total diversion of 381.3 ac-ft/yr. Ten acres were conveyed to AST West, Inc. in 2001, reducing the City's right to 117.1 acres and 351.3 ac-ft/yr. License L-2481 was issued for 182.4 acres, including 121.1 acres of crop land at 3 ac-ft/ac and 61.3 acres of native grasses at 1 ac-ft/ac, on February 20, 1964, for a total diversion of 424.6 ac-ft/yr.

Appendix G.

City of Lovington baseline water conservation

# Appendix G. City of Lovington Baseline Water Conservation

## **SCADA and Metering**

The City of Lovington water and wastewater departments use supervisory control and data acquisition (SCADA) systems to control pumping levels, pump hand off auto (HOA) controls, and lift station pumps. The water department has implemented a radio read meter system with GPS locations on meters and leak detection. Meter readings are collected on a monthly basis from a main meter that measures water going into the municipal distribution system. In terms of meters for individual City wells, some wells have meters that are out of service due to sand production. The majority of residential customer meters have been replaced since 2014.

## Water Rates

The City's water rate structure imposes additional costs on residential water uses that use over 3,000 gallons per month (gal/mon) and commercial customers that use over 5,000 gal/mon (Table G1; Appendix H). Under City Ordinances Nos. 482 and 483, water rates may be automatically adjusted to conform to periodic adjustments of the consumer price index (CPI).

quantity	monthly minimum cost	additional cost per 1,000 gallons	comments
commercial water rates			
first 5,000 gallons	\$33.79		automatically adjusted
over 5,000 gallons		\$2.05	adjustments of CPI
residential water rates			
first 3,000 gallons	\$22.44		automatically adjusted
over 3,000 gallons		\$1.99	adjustments of CPI

Table G1. Current water rate structure for monthly water billing, City of Lovington

CPI - consumer price index

## Water Reclamation

The City reclaims wastewater to irrigate non-food crops at the City farm. The amount of reclaimed water used for this purpose has been estimated at about 840 ac-ft/yr (0.75 MGD).

## Water Protection Ordinance

In an attempt to mitigate the potential for contamination of the City's potable groundwater supply, the City adopted Ordinance No. 449 requiring City-issued permits for drilling operations or re-entry within the City's well field, notification of the City engineer within 15 days of a leak or spill incident, annual leak surveying and reporting, and banning the drilling of disposal wells or conversion of existing wells into disposal wells within the City's well field. Ordinance No. 449 is included as Appendix I.

## **Other Water-Related Ordinances**

The City's Water Service System Ordinance (Chapter 13.04) prohibits the waste of water. The City's Emergency Water Restrictions Ordinance (Chapter 13.06; Appendix I) provides that in the event of a water emergency, during which City water service is interrupted or impeded due to climate conditions, plant breakdown, capacity of the water treatment plant, or otherwise, the City may establish restrictions or prohibitions on water use.

Although the City does not have a water conservation ordinance, the City's 2021 consumer confidence report includes water conservation tips and source water protection tips.

Appendix H.

Water Rates Ordinances

#### ORDINANCE NO. 483

# AN ORDINANCE MODIFYING AND AMENDING SECTION 13.12.060 TO INCREASE THE COMMERCIAL WATER RATES AND ESTABLISHING AUTOMATIC PRICE ADJUSTMENTS, EFFECTIVE SEPTEMBER 15, 2006.

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF LOVINGTON THAT 13.12.060 BE AND HEREBY IS , AMENDED AS FOLLOWS:

## 13.12.060 Commercial Water Rates.

The water rates to be charged and collected by the city from each commercial establishments obtaining service from the waterworks systems of the city shall be as follows:

Amended rates shall become effective September 15, 2007 and shall be automatically adjusted to conform to periodic adjustments of the Consumer Price Index (C.P.I.). Rate adjustments will take effect September 15<sup>th</sup> of each year.

First 5000 gallons Monthly minimum of \$23.92 \$ 23.92

Over 5000 gallons Additional \$1.45 for each additional 1000 gallons or part thereof

(Ord. 442 (part), 2002: Ord. 427 (part), 2000: Ord. 408 (part), 1997: Ord. 375 (part), 1993: amended during 1992 codification: Ord. 317, 1983: prior code § 4-3-15)

Upon passage, this Ordinance shall take effect September 15, 2007.

By:

APPROVED, PASSED AND ADOPTED this 10th day of September, 2007.



CITY OF LOVINGTON

Divie Drummo

DIXIE DRUMMOND, Mayor

ATTEST:

ondal

RHONDA JONES, City Clerk

### ORDINANCE NO. 482

AN ORDINANCE MODIFYING AND AMENDING SECTION 13.12.050 TO INCREASE THE RESIDENTIAL WATER RATES AND ESTABLISHING AUTOMATIC PRICE ADJUSTMENTS, EFFECTIVE SEPTEMBER 15, 2007.

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF LOVINGTON THAT 13.12.050 BE AND HEREBY IS , AMENDED AS FOLLOWS:

13.12.050 Residential Water Rates

The water rates to be charged and collected by the city from each residence obtaining service from the waterworks systems of the city shall be as follows:

Amended rates shall become effective September 15, 200 and shall be automatically adjusted to conform to periodic adjustments of the Consumer Price Index (C.P.I.). Rate adjustments will take effect September  $15^{\text{th}}$  of each year.

First 3000 gallons Monthly minimum of \$15.91 \$415.91

Over 3000 gallons Additional \$1.41 for each additional 1000 gallons or part thereof

(Ord. 442 (part), 2002: Ord. 427 (part), 2000: Ord. 408 (part), 1997: Ord. 375 (part), 1993: amended during 1992 codification: Ord. 318, 1983: prior code § 4-3-14)

Upon passage, this Ordinance shall take effect September 15, 2007.

APPROVED, PASSED AND ADOPTED this 10th day of September, 2007.



CITY OF LOVINGTON

mm By: **DIXIE DRUMMOND**, Mayor

ATTEST:

RHONDA JONES, City Clerk

Appendix I.

Water Protection Ordinance

### **ORDINANCE NO. 449**

An ordinance of the City of Lovington, New Mexico, amending and adding to Section 8.30.290 Proximity of Pipelines to Water Well and Requirements for Other Construction, of Chapter 8.30, Oil and Gas Wells and Pipelines, of the Lovington Municipal Code, and enacting new provisions of Chapter 8.30 Oil and Gas Wells and Pipelines, of the Municipal Code of the City of Lovington, New Mexico.

WHEREAS, the City of Lovington owns property outside its municipal boundary which contains water facilities for the City's municipal water supply; and,

WHEREAS, the territory occupied by the water facilities may be crossed from time to time by pipelines carrying hydrocarbons and other liquids related to oil and gas exploration and production, and other construction related to oil and gas activity may occur from time to time; and,

WHEREAS, the City is empowered under N.M.S.A 1978, §3-27-3 to enact ordinances to protect its water facilities from pollution.

NOW, THEREFORE, BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF LOVINGTON, NEW MEXICO, that:

An addition to Section 8.30.290 Proximity of Pipelines to Water Well and Requirements for other Construction, Chapter 8.30, Oil and Gas Wells and Pipelines, of the Lovington Municipal Code of the City of Lovington, New Mexico, in the following form, is hereby enacted:

#### **Amendment to § 8.30.290**

It shall be unlawful for any person to construct any pipeline not in compliance with this section 8.30.290. It shall be a separate offense for each day that a pipeline constructed in violation of this ordinance remains out of compliance, and upon conviction thereof, the offender shall be subject to a maximum fine of \$500.00 for each violation.

NOW, THEREFORE, BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF LOVINGTON, NEW MEXICO, that:

New Provisions of Chapter 8.30, Oil and Gas Wells and Pipelines, of the Lovington Municipal Code of the City of Lovington, New Mexico, being Section 8.30.300 through 8.30.520, in the following form, are hereby enacted:

#### 8.30.300. Permit Required

It shall be unlawful for any person to commence any drilling operation, any re-entry or

workover, or any other construction, operation, or activity within the confines of the water facilities field without first having been issued a permit from the City Commission pursuant to the applicable provisions of Chapter 8.30 of the Lovington Municipal Code. Provided, however, no permits shall be required for routine daily operations which do not disturb the surface of the field. Any operations commenced without issuance of a permit shall be considered an offense punishable by a maximum fine of \$500.00 per day for each day that such operation exists without first having obtained the required permit.

## 8.30.310. Maintenance of Facilities

All facilities constructed within the confines of the water facilities field, including without limitation, pipelines, tank batteries, pumping stations, compressor, drilling operations, well heads and other operations, shall be maintained using a prudent operator standard consistent with reasonable business practices within the oil and gas industry.

### 8.30.320. Reporting of Spills and Leaks

Any person operating a facility shall report any and all leaks or spills occurring within the confines of the water facilities field to the City Engineer immediately upon discovery, but in any event, such leak or spill shall be reported not more than fifteen (15) days from the occurrence.

Any such leak or spill shall be remediated in a manner acceptable to the City Engineer. Any such leak or spill shall be remediated as soon as is reasonably practicable, but in no event shall remediation operations be commenced later than thirty (30) days from the date the occurrence is first discovered and reported.

It shall be unlawful for any person to fail to report a leak or spill under this Section 8.30.320. It shall be unlawful to fail to take action to remediate any spill or leak as required by this Section 8.30.320. If remediation operations are not commenced within thirty (30) days from the date such spill or leak is first discovered and reported, it shall be a separate offense for each day after said thirty (30) days until the remediation operation is commenced, and upon conviction thereof, the offender shall be subject to a maximum fine of \$500.00 per day for each day after said thirty (30) days until the remediation operation is commenced.

Any operator, or employee, servant, agent or representative of an operator, who has knowledge of a spill or leak, and fails to report same to the City Engineer within the times specified herein shall be guilty of a misdemeanor and subject to a fine of \$500.00 or ninety (90) days in jail or both.

#### 8.30.330. Reporting Requirements

An accident report is required for each leak or spill in a facility subject to this chapter in which

there is a release of liquid resulting in any of the following:

- (a) Explosion or fire not intentionally set by the operator
- (b) Release of Five (5) gallons or more of liquid, except that no report is required for a release of less than five (5) barrels resulting from a maintenance activity if the release is:
  - (1) Not otherwise reportable under this Chapter;
  - (2) Confined to company property or right of way; and
  - (3) Cleaned up promptly.
- (c) Death of any person.
- (d) Personal injury necessitating hospitalization;
- (e) Estimated property damage, including cost of clean-up and recovery, value of lost product, and damage to the property of operator or others, or both, exceeding \$5,000.

#### 8.30.340. Leakage Surveys

Each operator must conduct a leakage survey with leak detector equipment within the confines of the water facilities field at intervals not exceeding fifteen (15) months, but at least once each calendar year. The results of each such survey shall be filed with the City Engineer within thirty (30) days of the completion of the survey.

It shall be unlawful to fail to provide an annual survey report to the City Engineer within thirty (30) days from the date the survey was performed, or should have been performed, and each day of failure thereafter shall be considered a separate offense, and upon conviction thereof the offender shall be subject to a maximum fine of \$500.00 per day that the report remains unfiled.

### 8.30.350. Definitions

The following definitions shall apply to any activity within the confines of the water facilities field.

(a) Brine means all nonpotable water resulting, obtained, or produced from the exploration, drilling, or production of oil or gas, or both.

- (b) Central production facility means production equipment which has been consolidated at a central location that provides for the commingling of oil or gas production, or both, from 2 or more prorated wells or production units.
- (c) City Engineer means that individual designated by ordinance, statute or the City Commission as the City Engineer together with any individual authorized to act on behalf of the City Engineer.
- (d) Drilling operations means all of the physical and mechanical aspects of constructing a well for the exploration or production of oil or gas, or both, for injection of fluids associated with the production of oil or gas, or both, or the storage of natural hydrocarbons or liquified petroleum gas derived from oil or gas, and includes all of the following:
  - (i) moving drilling equipment onto the drill site.
  - (ii) penetration of the ground by the drill bit and drilling of the well bore.
  - (iii) casing and sealing of the well bore.
  - (iv) constructions of well sites and access roads.
  - (v) workovers and recompletions.
- (e) Facility means any operation conducted within the confines of the water facilities field, including without limitation, pipelines, drilling operations, re-entry or workovers, tanks, holding facilities, treatment facilities, pumping and compressor stations, and any other facility used in the exploration for and production of oil and gas.
- (f) Operation of oil and gas well means the process of producing oil or gas, or both, or the storage of natural hydrocarbons or liquified petroleum gas, including all of the following:
  - (i) production, pumping, and flowing.
  - (ii) processing.
  - (iii) gathering.
  - (iv) compressing.

- (v) treating.
- (vi) transporting.
- (vii) conditioning.
- (viii) brine removal and disposal.
- (ix) separating.
- (x) storing.
- (xi) injecting.
- (xii) testing.
- (xiii) reporting.
- (xiv) maintenance and use of surface facilities.
- (xv) secondary recovery.
- (g) Operations means any activity conducted within the confines of the water facilities field and includes "drilling operations" and "operation of oil and gas wells".
- (h) Operator means any person who conducts operations.
- (i) Permit means a permit issued to an operator by the City Commission for operations within the Water Facilities Field.
- (j) Person means any individual, firm, joint venture, partnership, corporation, association, cooperative association, a joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.
- (k) Pipe means any pipe or tubing used in the movement or transportation of gases, petroleum products, brine water and any other substance, and includes pipe-type holders.
- (1) Pipeline means all parts of those physical facilities through which substances move in the water facilities field, including pipe, valves, and other appurtenances attached to pipe, compressor units, metering

stations, regulator stations, delivery stations, holders, and fabricated assemblies.

- (m) Surface facility means a facility used in the injection of fluids or in the production, processing, or treatment of oil or gas, or both, including any of the following:
  - (i) pumping equipment.
  - (ii) fluid disposal equipment.
  - (iii) facility piping.
  - (iv) load outs.
  - (v) separators.
  - (vi) storage tanks.
  - (vii) treatment equipment.
  - (viii) compressors.
- (n) Waste, in addition to its ordinary meaning, includes all of the following.
  - the definition of waste promulgated by the New Mexico Oil Conservation Division as found at 19 NMAC 15.A (83) as amended from time to time.
  - (ii) damage to underground fresh or mineral waters, natural brines, or other mineral deposits from operations for the discovery, development, and production and handling of oil and gas.
  - (iii) the unnecessary damage to or destruction of the surface, soils, animal, property, or other environmental values from or by oil and gas operations.
- (iv) the unnecessary endangerment of public health, safety, or welfare from or by oil and gas operations.

(o) Water Facilities Field means the area described in Section 8.30.290 of this chapter, together with any other real property which may be designated as such by the City Commission from time to time.

#### 8.30.360. Material Safety Data Sheets.

Any operator conducting operations within the confines of the water facilities field shall file with the City Engineer Material Safety Data Sheets (MSDS) for any and all substances used, produced, transported and otherwise present in operations conducted in the Water Facilities Field.

#### 8.30.370. Disposal Wells.

From and after the effective date of this ordinance, no person shall drill a disposal well, or convert an existing well into a disposal well, within the confines of the Water Facilities Field.

### 8.30.380. Preventing Waste.

Every person who conducts operations within the confines of the Water Facilities Field shall use every reasonable precaution to prevent waste.

#### 8.30.390. Drilling Mud Pits.

Any person who conducts operations in the Water Facilities Field shall use a closed system. All cuttings and fluids will be removed from the site and properly disposed of.

### 8.30.400. Well Records, Service Company Records.

- (A). A person who drills, deepens, changes well status, or completes a well after the effective date of this ordinance, shall keep and preserve at the well, during drilling, deepening, changes in well status, or completion operations, accurate records recording all geologic strata penetrated, casing and cement used, and other information as may be requested by the City Engineer in connection with the drilling of the well.
- (B). When requested by the City Engineer, an operator of a well shall file a copy of service company records, including records of all the following:
  - (i) mudding, cementing, and squeeze operations.
  - (ii) acidizing.
  - (iii) perforating.

- (iv) fracturing.
- (v) shooting.
- (vi) temperature surveys.
- (vii) bond logs.
- (viii) caliper surveys.
- (ix) wireline borehole and strata evaluation logs.

The City Engineer may request the records directly from the service company.

(C). An operator of a well shall make all records and information available to the City Engineer at all times. An operator shall protect the records from damage or destruction due to a preventable cause. All well data provided to the City Engineer, as required by these rules shall be held confidential commencing with the receipt of a written request from the operator, and shall remain confidential for ninety (90) days after drilling completion. Information on volumes, concentrations, and times of releases, spills, or leaks of gas, brine, crude oil, oil or gas field waste, or products and chemicals used in association with oil and gas exploration, production, disposal, or development is not subject to confidentiality.

#### 8.30.410. Oil Brine, or Associated Oil or Gas Field Waste; Storage.

An operator shall not retain oil, brine, or associated oil or gas field waste in earthen reservoirs or open receptacles.

### 8.30.420. Well Sites and Surface Facilities.

A person shall use every reasonable precaution to stop and prevent waste. All wells, surface facilities, gathering lines, and flow lines shall be constructed and operated so that the materials contained in the facilities do not cause waste. An oil and gas operation shall not be commenced or continued at a location where it is likely that a substance may escape in a quantity sufficient to pollute the air, soil, surface waters, or ground waters, or to cause unnecessary endangerment of public health, safety, or welfare until the operator has complied with the methods and means to prevent pollution or eliminate the unnecessary endangerment of public health, safety, or welfare as specified by the City Engineer.

### **8.30.430.** Prevention of Pollution, Contamination, or Danger.

The storage, transportation, or disposal of brine, crude oil, or oil or gas field waste that results in, or that the City Engineer determines may result in, pollution is prohibited. All operators shall ensure that wastes and brine are stored, transported and disposed of in a manner acceptable to the City Engineer and consistent with all applicable state and federal laws and regulations.

### 8.30.440. Monitoring of Injection and Disposal Wells.

- (A). The operator of a brine disposal well shall, on a weekly basis, monitor and record the injection pressure, injection rate, and cumulative volume of fluids injected. The operator shall report this data monthly to the City Engineer unless the City Engineer informs the operators in writing that said reports may be submitted on a less frequent basis. The data shall be submitted in a form approved by the City Engineer.
- (B). Operators of brine disposal injection wells shall file an annual monitoring report summarizing the data of the monitoring required in subsection (A) of this section, on or before March 1 of the year for the previous calendar year.
- (C). The operator of a secondary recovery injection well shall, on a monthly basis, monitor and record the injection pressure, injection rate, and cumulative volume of the fluid injected. An operator of a secondary recovery injection well may conduct the monitoring and recording, required by this section, on a field or project basis by manifold monitoring, rather than on an individual well basis, if more than one (1) secondary recovery injection well operates with a single manifold, and if the operator demonstrates that manifold monitoring is comparable to individual well monitoring. The operator shall report the data annually to the City Engineer in a form approved by the City Engineer, on or before March 1 of each year for the previous calendar year.
- (D). The operators of an injection well shall not operate an injection well unless the annual report is filed by March 1 for the previous year, and injection may not continue after failure to file on March 1 until the required report is submitted and written approval for resumed injection is received from the City Engineer.
- (E). All injection well records shall be retained by the operator for a period of three (3) years.

- (F). An operator of an injection well shall verbally notify the City Engineer, of any pressure test failure, significant pressure changes, or other evidence of a leak in an injection well, within 24 hours of the test failure, pressure change or evidence of a leak. If there is evidence that an injection well is not, or may not be, directing the injected fluid into the permitted injection strata, the operator shall immediately cease injection.
- (G). An operator shall submit written notice of the pressure test failure or other evidence of a leak to the City Engineer, within five (5) days of the occurrence. If injection has ceased pursuant to subsection (F) above, an operator shall not resume injection until the operator has tested or repaired the well, or both.
- (H). Nothing contained in this Section 8.30.440 shall be construed to permit the drilling of a brine disposal well, or conversion of an existing well into a brine disposal well, after the effective date of this ordinance.
- Failure to file any of the reports required by this Section 8.30.440 shall be an offense. Operation of a well contrary to the terms of this Section 8.30.440 shall be an offense. For each day that a well is operated in violation of any of the terms of this Section 8.30.440 it shall be a separate offense punishable by a maximum fine of \$500.00 per day.

## 8.30.450. Well Sites and Surface Facilities; Flammable and Combustible Material.

An operator of a well or other facility shall insure that the area around the well and surface facilities is kept clear of flammable and combustible material stored within a radius of 75 feet, or as approved by the City Engineer, using the well or dike wall as the point of measurement. The City Engineer, if conditions warrant, may also require construction of a fire line around the outer edge of the cleared area. An operator shall ensure that the disposal of material resulting from the clearing operations is consistent with all applicable state and federal laws and regulations.

#### 8.30.460. Secondary Containment Requirements and Construction Standards.

(A). All wellheads and pump jacks installed after the effective date of this ordinance and surface facilities constructed after the effective date of this ordinance, shall provide for secondary containment pursuant to the requirements of this section. The City Engineer may require surface facilities for hydrocarbon, gas, brine injection, or brine handling constructed before the effective date of this ordinance to be upgraded to meet the requirements of this section if the facility is

substantially reconstructed.

- (B). An operator shall submit secondary containment plans to the City Engineer for approval before construction of the facility. The secondary containment plans shall consist of a plot plan of the proposed facility and cross sections showing construction details of the sidewalls and floor or floors of all secondary containment areas, including the proposed overall dimensions of the facility. The City Engineer shall approve or disapprove the secondary containment plans within 30 days of receipt of the plans.
- (C). An operator shall comply with all of the following minimum construction standards to meet the secondary containment requirements of this rule:
- (1) An operator shall be required to prepare a hydrogeological investigation of the facility area to establish local background groundwater quality. The hydrogeological investigation shall include all of the following:
  - (i) Water quality sampling pursuant to the parameters established in the New Mexico Water Quality Control Act.
  - (ii) A determination of the direction of groundwater flow and depth to the groundwater in the uppermost aquifer.
  - (iii) A chemical analysis showing the concentrations of benzene, ethylbenzene, toluene, and xylene.
  - (iv) A geologic description of earth materials, both horizontally and vertically, in the immediate vicinity of the proposed facility.
- (2) Each facility shall be required to have 1 of the following monitoring systems to detect leakage from hydrocarbon or brine storage secondary containment areas:
  - A minimum of 1 groundwater monitoring well downgradient which is in close proximity to all hydrocarbon or brine storage secondary containment areas.

(ii) Tertiary containment underlying the secondary containment, which shall be constructed and sealed in a manner to capture any hydrocarbons or brine that may leak or seep through the secondary containment. A layer of permeable material and a monitoring tube shall be placed between the secondary and tertiary containment to allow monitoring to determine the presence of any leakage or seepage through the secondary containment.

(3) A vessel that contains hydrocarbons or brine, or both, shall be elevated and placed on impervious pads or constructed so that any leakage can be easily detected. A vessel that is to be used on-site for 30 days or less shall, at a minimum, be placed on leak-resistant material.

(4) A hydrocarbon and brine storage vessel, including oil heating and treating equipment, shall be located in a secondary containment area and the containment volume shall be in compliance with the following minimum requirements, as applicable.

- (i) Containment areas shall be constructed to contain 150% of the largest storage vessel.
- (ii) Precipitation shall be taken into consideration in the design of the secondary containment area.
- (5) The sidewalls and floor of the secondary containment and spill containment areas shall be constructed and sealed in a manner to prevent the seepage of hydrocarbons or brine, or both into the surrounding soils, surface waters, or groundwater.
- (6) A hydrocarbon and brine storage vessel shall not be erected, enclosed, or maintained closer that 200 feet from any drilling producing well.
- (7) Oil heating or treating equipment shall not be erected, enclosed, or maintained closer than 75 feet from any drilling or producing well or oil storage tank or tank battery.
- (8) Dikes shall be maintained and the enclosure kept free of all of the following:

- (i) Oil.
- (ii) Emulsions.
- (iii) Tank bottoms.
- (iv) Brine.
- (v) Water.
- (vi) Vegetation.
- (vii) Debris.
- (viii) Any flammable or combustible material.
- (9) The hydrocarbon and brine truck loading and unloading areas located outside of hydrocarbon or brine storage secondary containment areas shall have a spill containment capacity equal to double the volume of the hoses used to connect the truck to the tanks, but not less than a capacity of 5 barrels. The spill containment shall be constructed and sealed in a manner that prevents the seepage of hydrocarbons or brine, or both, into the surrounding soils, surface waters, or groundwater.
- (10) Brine disposal well truck unloading areas and commercial brine truck loading and unloading areas located outside of hydrocarbon or brine storage secondary containment areas shall be constructed and sealed in a manner that prevents the seepage of hydrocarbons or brine, or both, into the surrounding soils, surface waters, or grounndwater. In addition, a ramp shall be constructed to contain the unloading vehicle, its hoses, and connections within the ramp area. The ramp area shall contain a sump and be connected to a secondary containment area so that any spillage drains into the sump and into the secondary containment area. The spill containment ramp and sump shall have a combined capacity of not less than 20 barrels.
- (11) Sumps shall be constructed of materials impervious to hydrocarbons and brines and resistant to damage and deterioration during use. Sumps shall be connected to the ramp area and the secondary containment area in a manner that prevents leakage.
- (12) Surface facilities for hydrocarbon and brine handling shall be constructed to meet all of the following minimum requirements:

- (i) All transfer and injection pumps shall have leak containment.
- (ii) All brine and hydrocarbon flow lines to a facility are considered part of that facility and are subject to the following requirements:
- (a) All flow lines shall be pressure tested pursuant to the provisions of paragraph (iii) (a), (b), (c), (e), and (g) of this subdivision.
- (b) An operator may elect to not perform the pressure testing of the flow lines, except flow lines that transport brine only, if the operator performs visual inspection of the entire flow line corridor every 3 months, and reports the results of the inspections to the City Engineer annually by January 31 of each year for the previous calendar year.
- (iii) All buried facility piping for the transport of liquids shall be pressure-tested pursuant to the following provision, as applicable:
- (a) Piping made of noncorrodible or corrosion-protected material shall be pressure-tested every 3 years.
- (b) All piping other than piping specified in subparagraph
  (a) of this paragraph shall be pressure-tested every 12 months.
- (c) If buried piping is excavated for repair or relocation, then the disturbed portion shall be pressure-tested immediately pursuant to subparagraphs (d) and (e) of his paragraph.
- (d) The pressure test shall be 100% of the normal oil and gas separator operating pressure. The pressure shall be stabilized at 90% of test pressure, at a minimum, and shall hold for a period of 15 minutes.
- (e) An operator shall provide certification to the City Engineer, within 30 days of a pressure test, that a pressure test was conducted and the facility piping

passed the pressure test. If a facility's piping does not pass the pressure test, the City Engineer shall be notified by the operator within 48 hours after the test. If the pressure test indicated that the facility's piping leaked, then the piping shall be repaired and tested before putting the piping back in service. After the repair of the piping, the operator shall report the repair to the City Engineer and provide certification that the piping has been retested and is not leaking.

- (f) Single-phase gas lines are not subject to the pressure test requirements if the lines are protected by a liquid phase trap.
- (g) The City Engineer may approve or require other pressure testing or leak detection methods in place of the pressure testing required in this paragraph.
- (iv) At production or injection well facilities, all piping shall be routed above the ground and kept within the secondary containment area where practical. Piping that cannot be routed above the ground shall have its location marked with posts or with other locationidentifying markers approved by the City Engineer so that the buried piping can be easily located.
- (v) Brine injection wells shall have a working check valve on the flow line at or near the wellhead to avoid backflow.
- (vi) All hydrocarbon and brine loading and unloading facility transfer lines that are not in use shall be secured to prevent spillage. A shutoff valve shall be installed at the truck connect point and at the storage vessels. At connect points, impermeable drip containment vessels shall be used and shall be an adequate size to contain all spillage and precipitation to avoid overflow.
- (13) Wellheads, flare pits, vents, and flare stacks shall have secondary containment and spill containment areas constructed in a manner to prevent the seepage of hydrocarbons or brine, or both, into the

surrounding soils, surface waters, or groundwater. Secondary containment at the wellhead shall be constructed in a manner to capture any leakage of liquid that may occur. In addition, if the wellhead is provided with a pump jack or is converted to a pump jack equipped with a gasoline or diesel-powered engine, then the engine shall also have secondary containment that is sufficient to prevent the seepage of any machine oils or fuels into the surrounding soils, surface waters, or groundwater.

- (D) Upon completion of the construction of the facility, but before its use, an operator shall certify, to the City Engineer, that the secondary containment area was constructed according to the approved plan. An operator shall ensure that an approved spill or loss response and remedial action plan is also on file with the City Engineer before a facility is used.
- (E) Before any significant modification of the secondary containment area occurs, an operator of a well shall notify the City Engineer and receive approval before making the modification. The City Engineer shall approve or deny the request within 10 days of receipt of the request.
- (F) An operator of a well shall perform inspections at the facility at a frequency that is sufficient to ensure that the throughput of fluids in the system does not exceed the primary and secondary containment capacity between inspections. The operator shall perform at least 1 inspection per week.
- (G) The City Engineer shall require the installation of an automatic facility shutdown system if the facility has a throughput of liquids in a 24-hour period that exceeds the containment volume of secondary containment area. The automatic shutdown system shall be designed to prevent liquids from overflowing the secondary containment area. A facility shall be exempt from the requirement of an automatic shutdown system if the facility has staff present 24 hours per day and is equipped with alarm systems on the tank or the tanks of the tank battery.
- (H) The monitoring system required by 8.30.460. (C) (2) shall be kept in a functional condition so that water samples can be collected and water level measurements can be taken every 6 months. The water samples shall be tested for specific conductance as an indicator of dissolved solids, concentrations of chloride, and chemical analysis pursuant to subsection (C) (1) (iii) of this section, except the chemical analysis provided by subsection (C) (1) (iii) of this section shall not be
required at monitoring systems at surface facilities where liquid hydrocarbons are not handled. The results of the sample analysis shall be provided to the City Engineer as soon as the results are available. If the samples taken by the operator show substantial increases above background water quality, then the operator shall, at a minimum, increase monitoring. If the samples confirm that hydrocarbons are present at levels above background, then the operator shall immediately take remedial action in the form of containment and removal.

- (I) An operator shall provide a right of entry to the facility for monitoring at all times to the City Engineer.
- (J) Failure to comply with any of the provisions of this Section 8.30.460 shall be an offense. For each day that a facility is operated in violation of this Section 8.30.460, it shall be a separate offense punishable by a maximum fine of \$500.00 per day.

#### 8.30.470. Restoration of Well Site; Filling and Leveling of Cellars, Pits, and Excavations;

An operator of a well shall fill and level the cellar and all pits and excavations, remove or eliminate debris, minimize erosion, and restore the well site as nearly as practicable to the original land contour or to a condition approved by the City Engineer as soon as practical after the completion of plugging to the surface, but not more than 6 months after the completion of plugging to the surface.

#### 8.30.480. Safety Measures.

If hazards to life or property, or both, exist, then an operator of a well shall post safety signs in conspicuous places around the well or surface facility. The City Engineer may require the installation of fences, gates, or other safety measures.

# 8.30.490. Use of Pits to Collect Waste Oil and Tank Bottoms Prohibited; Conveying, Storing, or Disposing of Waste Oil and Tank Bottoms.

An operator of a well shall not use earthen pits to collect waste oil and tank bottoms. An operator shall not convey, store, or dispose of waste oil and tank bottoms in a manner that causes waste.

#### 8.30.500. Cleanup and Disposal of Losses.

An operator shall clean up and dispose of, in a manner consistent with this chapter and all

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applicable state and federal laws and regulations, losses of oil, gas or brine from wells, flow lines, and associated surface facilities.

#### 8.30.510. Enforcement.

The City shall have the right to enforce the provisions of Chapter 8.30 through both its civil or criminal jurisdiction in both the Municipal Court of the City of Lovington or the District Courts of the State of New Mexico. In the event of a violation of this Chapter 8.30, the appropriate authorities of the City, in addition to other available remedies, may institute injunction, mandamus or other appropriate action or proceeding to prevent, enjoin or remedy such violation. A separate offense shall be deemed committed for each day during or on which a violation of this Chapter 8.30 occurs or continues to occur.

#### 8.30.520. Severability.

If any part or application of this Chapter 8.30 is held invalid, the remainder or its application to other situations or persons shall not be affected.

Appendix J.

**Emergency Water Restrictions Ordinance** 

### 13.06.010 Emergency water restrictions.

A. In the event of emergency conditions affecting the availability of domestic water through the city facilities at any time due to climatic conditions, plant breakdown, capacity of the water treatment plant, or otherwise, the city manager may declare a water emergency and establish further restrictions or prohibitions for any exterior water application.

B. During periods of emergency water restrictions, no domestic water shall be used for garden, lawn or other exterior watering or sprinkling application, except upon the premises having an even street address on even days of the month or having an odd street address on odd days of the month and only during the hours of five-thirty p.m. and ten p.m.

C. No exterior watering shall be allowed on the thirty-first day of any month having thirty-one days.

D. Such restrictions shall not apply to water used primarily in the course and conduct of a recognized and ongoing business activity.

E. During emergency water restriction periods, the city manager may issue a special permit allowing daily watering during the designated hours for watering for a maximum of twenty-one days for new seed, or ten days for new sod, or for a time determined appropriate for other exceptional requirements. (Ord. 434 (part), 2001)

Appendix K.

Forms for water-level measurements and meter readings

#### WATER-LEVEL MEASUREMENT

PAGE:\_\_\_\_OF\_\_\_\_

 Well NMOSE #:\_\_\_\_\_

Location Description: Land Surface Elevation:

 Well Depth, Ft:
 Screen Interval:
 Casing Diameter, In.:

Description of Measuring Point:

Date	Time	Non- Pumping Water Level, ft <sup>a</sup>	Pumping Water Level, ft <sup>b</sup>	Pumping Rate, gpm	Measurement Collected by	<b>Comments/Problems</b> (include items such as sand production, pump cavitation, meter problem, etc.)

<sup>a</sup> Non-pumping water level should not be collected unless well shut down for at least 4 hours.

<sup>b</sup> Pumping water level should <u>not</u> be collected unless well has been pumping for at least 4 hours. gpm - gallons per minute

## WATER-METER READING

Well Common Name:			
Brand of Meter:	_Meter Serial No.:		
Meter Units; Circle One: gallons, acre-feet, barrels	Multiplier: units X		
Meter Location:			

Date	Time	Totalizer Reading	Instantaneous Pumping Rate	Measurement Collected by	Comments/Problems